PB-240 787

STUDIES IN ENVIRONMENT. VOLUME II. QUALITY OF LIFE

Kenneth E. Hornback, et al

Homer Hoyt Institute

Prepared for:

National Bureau of Standards
Washington Environmental Research Center

November 1973

DISTRIBUTED BY:

NTIS
National Technical Information Service
U. S. DEPARTMENT OF COMMERCE

SELECTED WATER RESOURCES ABSTRACTS
INPUT TRANSACTION FORM

3. Accession No.
PB 240 787

4. Title
STUDIES IN ENVIRONMENT - Volume II - Quality of Life

7. Author(s) Kenneth Hornback, Joel Guttman, Harold Himmelstein, Ann Rappaport, Roy Reyna

9. Organization
Homer Hoyt Institute
Washington, D. C.

10. Project No.

11. Contract/Grant No.
801473

15. Supplementary Notes Environmental Protection Agency report number EPA-600/5-73-012b, November 1973

16. Abstract This report investigates the concept of the Quality of Life (QOL) and presents a developmental methodology for constructing a measurement scheme ~~to assess the QOL. Introductory sections~~ give a breif synopsis of the research that has been done in this area to date, including various guidelines and rationale used in attempting to develop a meaningful social indicator for the QOL, and the current state-of-the-art and the research concerning attempts to adequately define and assess Quality of Life. ~~The report also~~ discusses the functional relationship between objective and subjective conditions used as a theoretical framework to measure QOL and develop a Quality of Life Index. A rationale for the statistical treatment employed for the various parameters is set forth stressing the importance of the relationship between what actually exists and group perception of it. QOL factors are presented encompassing Economic, Social Political, Health, Physical and Natural Environmental Sectors. Each of these factor lists is divided into subfactors and encompasses such things as income distribution, family, electoral participation, nutrition, housing and air. Objective measures, where they exist, are given for each subfactor, although they are merely examples and by no means an exhaustive listing. The report closes with a discussion of analytical dimensions of a Quality of Life Index (QOLI) and the potential uses and misuses of such an Index.

The study

17a. Descriptors
Quality of Life, Quality of Life Index, Social and Economic Indicators

17b. Identifiers

17c. COWRR Field & Group

18. Availability

Send To:
WATER RESOURCES SCIENTIFIC INFORMATION CENTER
U.S. DEPARTMENT OF THE INTERIOR
WASHINGTON, D. C. 20240

Abstractor John Gerba

Institution Environmental Protection Agency

WRSIC 102 (REV. JUNE 1971)

Reproduced by
NATIONAL TECHNICAL INFORMATION SERVICE
US Department of Commerce
Springfield, VA. 22151

PRICES SUBJECT TO CHANGE

EPA-600/5-73-012b
November 1973

STUDIES IN ENVIRONMENT

Volume II

Quality of Life

by

Kenneth E. Hornback
Joel Guttman
Harold L. Himmelstein
Ann Rappaport
Roy Reyna

Grant No. 801473
Program Element 1HA098

Project Officers

Samuel Ratick
John Gerba
Environmental Studies Division
Washington Environmental Research Center

Prepared for
Office of Research and Development
U.S. Environmental Protection Agency
Washington, D.C. 20460

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

RESEARCH REPORTING SERIES

Research reports of the Office of Research and Development, Environmental Protection Agency, have been grouped into five series. These five broad categories were established to facilitate further development and application of environmental technology. Elimination of traditional grouping was consciously planned to foster technology transfer and a maximum interface in related fields. The five series are:

1. Environmental Health Effects Research
2. Environmental Protection Technology
3. Ecological Research
4. Environmental Monitoring
5. Socioeconomic Environmental Studies

This report has been assigned to the SOCIOECONOMIC ENVIRONMENTAL STUDIES series. This series includes research on environmental management, comprehensive planning and forecasting and analysis methodologies. Included are tools for determining varying impacts of alternative policies, analyses of environmental planning techniques at the regional, state and local levels, and approaches to measuring environmental quality perceptions. Such topics as urban form, industrial mix, growth policies, control and organizational structure are discussed in terms of optimal environmental performance. These interdisciplinary studies and systems analyses are presented in forms varying from quantitative relational analyses to management and policy-oriented reports.

EPA REVIEW NOTICE

This report has been reviewed by the Office of Research and Development, EPA, and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

ABSTRACT

This report investigates the concept of the Quality of Life (QOL) and presents a developmental methodology for constructing a measurement scheme to assess the QOL. Introductory sections give a brief synopsis of the research that has been done in this area to date including various guidelines and rationale used in attempting to develop a meaningful social indicator for the QOL, and the current state-of-the-art and the research concerning attempts to adequately define and assess Quality of Life.

An operational definition of a QOL index and discussion of terminology is next presented. Lastly the introductory material lists those areas of concern which were not included as part of the overall strategy in developing and analyzing the proposed measurement scheme.

Thereafter the report discusses the functional relationship between objective and subjective conditions used as a theoretical framework to measure QOL and develop a Quality of Life Index. A rationale for the statistical treatment employed for the various parameters is set forth stressing the importance of the relationship between what actually exists and group perception of it.

QOL factors are presented encompassing Economic, Social, Political, Health, Physical and Natural Environmental Sectors. Each of these factor lists is divided into subfactors and encompasses such things as income distribution, family, electoral participation, nutrition, housing, and air. Objective measures, where they exist, are given for each subfactor, although they are merely examples and by no means an exhaustive listing.

The report closes with a discussion of analytical dimensions of a Quality of Life Index (QOLI) and the potential uses and misuses of such an Index.

CONTENTS

Page

Abstract ii

Contents iii

Figures iv

Acknowledgments v

Sections

I Introduction 1

II Social Indicators and the QOL: State-of-the-Art 7

III Research on the QOL 12

IV QOL: An Operational Definition 15

V The Functional Relationship 21

VI Quality of Life Factors 29

VII Analytical Dimensions 67

VIII Policy Implications 81

IX Appendices 92

FIGURES

No. **Page**

1 Comparison of QOL Factor List 32

2 Quality of Life Factors 34

ACKNOWLEDGEMENTS

PROJECT MANAGEMENT

for Environmental Protection Agency:
Samuel Ratick, Physical Scientist, ESD, Fellows Counselor
John Gerba, Chief, Special Projects, ESD, Report Production
for Homer Hoyt Institute:
Maury Seldin, President
for National Bureau of Standards:
Lynn G. Llewellyn, Research Psychologist, TAD

HOMER HOYT INSTITUTE

John Kokus, Jr., Deputy Director

John Hemmaker, Research Director

Ira Bechoefer, Sr. Research & Administrative Assistant

NATIONAL BUREAU OF STANDARDS

Marilyn Westfall, Operations Research Analyst, TAD

Gail Hare, Research Psychologist, TAD

Donald Corrigan, Legislative Research Analyst, TAD

ENVIRONMENTAL PROTECTION AGENCY

Stanley M. Greenfield, Assistant Administrator for Research and Development
Leland Attaway, Deputy Assistant Administrator for Research
Peter House, Director, Environmental Studies Division
Robert Livingston, Research Analyst, ESD
Alan Neuschatz, Chief, Environmental Management Research Branch, ESD
Philip D. Patterson, Assistant to the Director, ESD
Albert Pines, Operations Research Analyst, ESD
Martin Redding, Chief, Comprehensive Environmental Planning Branch, ESD

SECTION I
INTRODUCTION

I.A The Problem

At no other time in American history has the average person had the advantage of such a vast range of alternative activities both in work and play. Moreover, there is ample free time and wealth to allow the majority of people the opportunity to realize their individual goals. However, segments of the American populace expresses general restlessness and discontentment. The problem is explicitly stated by Campbell and Converse: "Discontentment with objective conditions has appeared to be increasing over exactly the same period that those conditions have at most points and by almost all criteria been improving, a discrepancy with portentous social and political implications."[1] Writers of the popular press diagnose various aspects of the problem as "future shock"[2] or retarded "consciousness levels."[3]

Daniel Bell has offered an explanation for dissatisfaction with improved objective conditions.

> "It is this aspect of social change which gives rise to a rather curious discrepancy of social perception. The national output will double, or individuals will find that their own incomes have doubled over a period of time, yet there will be complaints that people are not living twice as well as before. The entry of more and more disadvantaged persons into the society as claimants for goods and privileges, clearly changes the nature of privileges and services themselves."[4]

The dissatisfaction stems from different reactions to conditions and the multiplicity of objective and subjective methods by which people evaluate their conditions. Ambiguity over standards and conditions is a concomitant to quickly achieving a high energy, complex, and competitive technological society. After years of vying for achievements, the American public has begun to question the relative value of what they have achieved.

The paradox is that the growth in the material wealth traditionally associated with a high Quality of Life (QOL) may[5] not have brought an improvement in a QOL which considers other factors also. Even this subset of QOL which is materially oriented may not reflect an increase because levels of expectations have risen faster than material improvements. Traditional public management strategies of dealing with the logistical problems of material welfare are fading as the general level of living improves and physical needs evolve into more complex preferences, expectations, and aesthetic as well as social values. Old notions of material standards for physical needs are being replaced by new material and non-material standards for sociological needs such as: (1) material goods which are safe, durable, and easy to maintain; (2) safe, public association with other human beings; (3) accessible open spaces for play or contemplation; (4) trustworthy information media; (5) time to be sick, idle, or creative.

Growing recognition of this national condition is prompting wider interest among government officials to learn how to improve the assessment of public preferences in order to elevate the quality of public administration, decision making, and, as a result, the quality of life.[6] To date, there has been no sufficient definition of the QOL or specifications of the conditions associated with it. In addition, there are no standards for what the QOL should be, and if there were, there would be no way to know if they were adequate standards for all Americans.

The omnibus task of defining and measuring the Quality of Life is an attempt to formulate a comprehensive methodology to validly assess these types of questions and problems.

I.B The Objectives

As an initial step in resolving the above problems, the Environmental Protection Agency Summer Fellows Program charged a Quality of Life team with the task of determining a measurement scheme to assess the QOL. First, a few necessary, preliminary mandates which could act as guidelines for determining the QOL definition and measurement scheme were established. It was determined that any factors associated with the QOL concept must meet the following requirements:

1. Apply to all Americans.

2. Specify points about which there is general consensus among the population (factors must have face validity).

3. Focus on areas in which individuals have an active personal interest. (This stipulation was intended to exclude the difficulties which might be associated with identifying a national priority with an individual priority.)

4. Focus on areas in which there are known or conceivable strategies of social organization (societal management) which can influence the factor. (This stipulation was intended to exclude the problem of identifying personal priorities of individuals and reidentifying them as matters related to the QOL for all persons.)

5. Focus on areas for which there are measureable objective and subjective features.

6. Reflect differences among people under widely ranging conditions.

7. Be sensitive to changing social and physical conditions.

8. Be open to criticism (must not totally be definitional) and proof or disproof according to recognized performance criteria.

As will be shown in Section II, the QOL measurement problem is one which uniquely addresses itself to both objective and subjective sources of data[7] in contrast to economic or demographic indicators which are more limited in scope.[8] Not only are we concerned with assessing a condition, but also with collecting a full range of individual evaluations of the various states of that condition by all persons subject to the condition. Because of this stipulation, point 5 was incorporated into the guidelines.

When the concept of QOL is combined with the notion of quantification or measurement, a source of vast criticism and nearly total skepticism is introduced. Bertram M. Gross captures the disbelief associated with measuring a vague and ill-defined phenomenon:

> The difficulty here, whether we have reference to a community, a nation, or the world itself, is not the absence of any common interests. It is rather the profusion of common interests, a profusion so rich that it can never be expressed without serious distortion, in a single formula.[9]

This report is an attempt to penetrate this apparent barrier. In consideration of the limitations suggested by Gross, points 6, 7, and 8 were included in the list.

I.C The Methodology

In working toward a solution for the problem of developing a measurement of the QOL the following points were examined in detail:

1. Review of the literature which specializes in social indicators and research focusing more specifically on the concept of QOL itself (Sections II and III).

2. Definition of the QOL in relation to point one (1) above (Section IV).

3. Identification of an indexing tool or formula for measuring the QOL (Section V).

4. Identification and discussion of the factors involved in the QOL, their objective and subjective measurement (Section VI).

5. Discussion of the analysis of QOL data which would be generated by the use of the measurement device defined in point three (3) above (Section VII).

6. Suggestions of policy implications and the utility of information generated (Section VIII).

Each one of these points is presented as a subsequent chapter of this report.

FOOTNOTES AND REFERENCES

1. Angus Campbell and Philip E. Converse, The Human Meaning of Social Change (New York: Russell Sage Foundation, 1972), p. 9.

2. Alvin Toffler, Future Shock (New York: Bantam Books, 1971).

3. Charles Reich, The Greening of America (New York: Bantam Books, 1971).

4. Daniel Bell, "The Adequacy of Our Concepts," in A Great Society, ed. by Bertram M. Gross (New York: Basic Books, 1966), p. 144.

5. Unfortunately we have no comparative data to judge this.

6. Daniel Bell, "The Idea of a Social Report," The Public Interest, #15 (Spring, 1969), pp. 72-84. Bell identifies an unresolved problem which may be associated with this new sensitivity. He depicts government in the role of an umpire who mediates between the interests of its most verbal citizens. It is not totally a one-way process, however, because of the possibility that government can exercise discretion in determining "which interests to allow to become inputs," and even to seek those interests out. These problems are covered in Peter J. Heuroit, "Political Questions About Social Indicators," The Western Political Quarterly, Vol. XXII, No. 2, June, 1970, pp. 235-255.

7. The idea of incorporating the subjective or normative element is not original, though comparatively new.

Ross Stanger, "Perceptions, Aspirations, Frustrations, and Satisfactions: An Approach to Urban Indicators," Annals of the American Association of Political and Social Science, vol. 388 (March, 1970) pp. 59-68.

U.S. Department of Health, Education, and Welfare, Toward A Social Report, Washington, D.C.: Government Printing Office, 1969.

Daniel Bell, "The Idea of a Social Report," The Public Interest, #15 (Spring, 1969), pp. 72-84.

Also Chapter one in Campbell and Converse, The Human Meaning of Social Change.

8. See Bertram M. Gross, The State of the Nation: Social Systems Accounting (London: Tavistok, 1966). Gross discusses the problems of the ". . . new Philistinism--an approach to life based on the principle of using monetary units as the common denominator of all that is important in human life." p. 19.

9. Bertram M. Gross, The Managing of Organizations (New York: The Free Press, 1964), p. 525.

SECTION II

SOCIAL INDICATORS AND THE QOL: STATE-OF-THE-ART

Until the mid-1950's, the major sources of "hard" data to guide decision makers were economic indicators such as the Consumer Price Index and the Gross National Product, and Census data comprising of standard demographic information about the characteristics and distribution of the American people. Anticipation of the need for a new kind of information can probably be traced to the impact of Sputnik--the first orbiting space satellite launched by the U.S.S.R. in 1958. Although the most visible reaction was the scramble to surpass the Soviets in missile technology, a secondary effect occurred. Margaret Mead, commissioned to determine the reaction of the American people to the launching, set about determining "social indicators," a task which has progressed slowly in comparison with the dramatic advances in science and technology.[1]

By 1966, some formal statements about the need for social indicators became available. Daniel Bell acted as spokesman for the "new" kind of information:

> What we need, in effect, is a system of Social Accounts which would broaden our concept of costs and benefits, and put economic accounting into a broader framework (to) move toward measurement of the utilization of human resources in our social information areas: (1) the measurement of social costs and net returns of innovations; (2) the measurement of social ills . . .; (3) the creation of 'performance budgets' in areas of defined social needs . . .; and (4) indicators of economic opportunity and social mobility.[2]

In the same year Bertram Gross published a discussion on social "systems accounting"[3] with aid from the National Aeronautics and Space Administration. NASA also sponsored the work of Raymond Bauer,[4] which attempts to judge the impact of the space program on the American society.

In 1968 Sheldon and Moore edited *Indicators of Social Change: Concepts and Measurements*.[5] As a textbook on the status of economic and sociological research it furnished decision makers with a series of scholarly analytical and theoretical discussions on the demographic, structural, distributive, and aggregative features of American society. The violence of the 1960's argued strongly against an accounting system patterned after the economic and demographic models alone. Opposition soon began to be voiced, most visibly in the widely circulated Health, Education, and Welfare document, *Toward a Social Report*:

> If the Nation is to be able to do better social reporting in the future it will need a wide variety

> of information that is not available now. It will need not only statistics on different groups of Americans. It will need more data on the aged, on youth, and on women, as well as on ethnic minorities. It will need information not only on objective conditions, but also on how different groups of Americans perceive the conditions in which they find themselves.[6]

Later in 1969, Otis Dudley Duncan published "Toward Social Reporting: Next Steps,"[7] which clarified for the social science professional community the problem which was suggested by the HEW document. Duncan carefully cited the research objectives which are required if decision makers are to be provided with accurate and reliable information about the state of the social system. In his argument for higher quality replicative studies, Duncan proposed more rigorous procedural steps, greater data exchange among researchers, more attention to calibration, and cohort analysis as key areas of needed improvement. Duncan suggests fourteen areas of immediate interest including studies of occupational change, environmental pollution, victimization by criminal acts, educational opportunities, mental health, and value changes.

The Human Meaning of Social Change,[8] by Campbell and Converse, updates Sheldon and Moore and articulates an area which seemed to have been left out earlier--the social psychology of the nation:

> "Whereas the parent volume (Sheldon and Moore) was concerned with various kinds of hard data, typically sociostructural, this book is devoted chiefly to so called softer data of a more social-psychological sort: the attitudes, expectations, aspirations, and values of the American population."[9]

Campbell and Converse treat many important areas not earlier discussed under the topic of social indicators: time use, measures of "community," the meaning of work, alienation, satisfaction, etc.

This recent history of the growing interest in social indicators suggests several trends: (1) there is a growing interest in methodological rigor and a desire to compare and validate various research strategies; (2) there is increasing emphasis on the development of standardized time series data and the expansion of Federal statistical activities; (3) there is growing emphasis on the collection and analysis of subjective data and the expansion of traditional areas of data collection; and (4) the emergence of a clearer picture of what subjective data will be important, i.e., information on occupational status, time budgets, mental health, political participation, etc.[10] As yet, however, there has been no merger of these developments into one theoretical or methodological strategy. The objective of developing a QOL definition and measurement strategy would logically be this kind of task and would draw upon the developments mentioned above. The following chapter will review the QOL research which has been done and examine the extent to which it has developed theoretical perspectives or methodologies which synthesize these developments.

FOOTNOTES AND REFERENCES

1. Margaret Mead, *et al.*, "Man in Space: A Tool and Program for the Study *of Social Change*," *Annals of the New York Academy of Science*, vol. 72, no. 4 (April 10, 1958), pp. 165-214.

2. Daniel Bell, "The Adequacy of Our Concepts," in *A Great Society?*, ed. by Bertram M. Gross (New York: Basic Books, 1966), p. 152.

3. Bertram M. Gross, *The State of the Nation: Social Systems Accounting* (London: Tavistok, 1966).

4. Raymond A. Bauer, *Social Indicators* (Cambridge, Mass.: MIT Press, 1966).

5. Eleanor B. Sheldon and Wibert E. Moore, *Indicators of Social Change: Concepts and Measurements* (New York: Russell Sage Foundation, 1968).

6. U.S. Department of Health, Education, and Welfare, *Toward a Social Report*, Washington, D.C.: Government Printing Office, 1969, p. xiv.

7. Otis Dudley Ducan, "Toward Social Reporting: Next Steps," *Social Science Frontiers* (New York: Russell Sage Foundation, 1969).

8. Angus Campbell and Philip E. Converse, *The Human Meaning of Social Change* (New York: Russell Sage Foundation, 1972).

9. Campbell and Converse, *The Human Meaning of Social Change*, p. 5.

10. For reviews of this history see:

John Lear, "Where Is Society Going? The Search for Landmarks," *Saturday Review*, April 15, 1972, pp. 34-39.

Bertram M. Gross and Michael Springer, "A New Orientation in American Government," *Annals of the American Association of Political and Social Science*, vol. 371 (May, 1967), pp. 1-19.

Daniel Bell, "The Idea of a Social Report," *The Public Interest*, #15 (Spring, 1969), pp. 72-84.

A. D. Duncan, "Discrimination Against Negroes," *Annals of the American Association of Political and Social Science*, vol. 371 (May, 1967), pp. 96 ff.

H. J. Dyos, "Some Historical Reflections on the Quality of Urban Life," in *The Quality of Urban Life*, ed. by Henry J. Schmandt and Warner Bloomberg, Jr. (Beverly Hills, California: Sage Publications, 1969).

SECTION III
RESEARCH ON THE QOL

Research which focuses specifically on the QOL may be dichotomized into the categories of basic and applied research. Basic research generally includes the work of university related researchers, some non-profit research institutions, and a few commercial organizations. Applied efforts are those which for the most part have been performed by commercial research organizations or agencies of government whose primary interest is other than basic research. This report reviews eleven pieces of QOL research, four of which fall under the "basic research" category and seven which fall under the "applied research" category. The work being referenced is abstracted in Appendix A and will only be discussed generally in the body of this chapter.

The most conspicuous shortcoming of QOL research in general is its failure to develop a clear definition for the QOL concept. The most systematic attention given to the definitional problem is provided by Triplett[1] in a discussion of hedonic quality as it relates to price indices. He suggests that the concept of quality may mean the attributes of a thing, the essence of a thing, or the ranking of things. Adapting this summary of definitions, the QOL may be defined variously as: the attributes of life or the composition of things or events characteristic of a group; the essence of life styles, the basic nature, or spiritual nature of a life style which makes it distinguishable from another life style; or the ranking of life styles according to a further defined standard. None of these definitions has been used consistently by QOL research.

Authors' discussions of the QOL more frequently ignore the definitional problem altogether by simply listing the things they mean to include in the concept. Few have paid attention, unfortunately, to the lists other scholars have developed for there is limited consensus as to content and little cross-referencing. (Comparisons of these lists may be made by turning to Table 6.1, Section 6.0.)

Where specific QOL definitions have been generated they often suffer from other logical problems. Dalkey and Rourke[2] suggest that the QOL is "a persons sense of well being, his satisfaction or dissatisfaction with life, or his happiness or unhappiness."[3] Such a definition may serve other purposes but as a definition of the QOL it poses an unresolvable problem: the projection of individual psychological welfare as the model for the collectivity. Elsewhere Dalkey makes a distinction between "armchair" analysis and public surveys.[4] The major example offered for "armchair" approaches is the Report of the President's Commission on National Goals and Values (1960).[5] The goals and values identified by this report include individual status, racial equality, state and local government, education, economic growth and quality, technological change, agriculture, living conditions, and health and welfare. Although these areas are of uncontested importance, they hardly represent uni-dimensional factors which can be accepted as relevant to the QOL without further explanation. The use of desirable political objectives as a QOL definition is erroneous in the opposite sense of Dalkey's psychological reductionism--it suggests that what is good for the country is good for the individual.

The difficulty associated with the dependence on politically oriented goals suggests a series of general criticisms which were found to be characteristic of applied QOL research: (1) lack of a precise goal or conceptual domain inherited from the contracting agency and, subsequently, little initiative to work out problems not explicit in the contractual relationship; (2) the development of measurement devices which are definitionally infallible; (3) the presentation of data which is simplistic but not descriptive; (4) the failure to establish evaluation criteria, interpretive rationales, or specify confidence limitations. Where great promise is associated with a project, such as HEW's Neighborhood Environmental Evaluation and Decision System (NEEDS) Program (see Appendix A), there does not seem to be a well funded agency interest in data analysis and validity assessment--"results" are forwarded in more or less "raw" form.

The alternative of turning to "basic research" sources has not been exploited. Consequently, basic research endeavors are not numerous enough to justify general comment. Such activities exist in pockets of academic interest which will likely become more active in time. Advanced research on QOL is being carried out at the present time by the Ann Arbor Institute for Survey Research work on "Monitoring the Quality of American Life." This program of research builds upon earlier work of Perloff at UCLA and Dalkey at RAND. A portion of the Ann Arbor work is directed primarily toward the development of valid measures and analytical strategies. Exploratory survey research is also being carried out to determine what elements are involved in the concept of QOL as it is understood by the public.

In terms of the trends characterizing social indicator research, the Institute for Survey Research is developing basic knowledge necessary to meet each of the emerging areas of interest. None of the research focusing on the QOL has addressed itself systematically to the theoretical problem of synthesizing a definition of the QOL or its components from other available related work. Moreover, few of these endeavors have focused on both objective and subjective data (excepting NEEDS) and, there are no schemes available which show how this might be done. The following two sections represent an attempt to come to grips with the definitional problem of the QOL and specify its scope limitations.

FOOTNOTES AND REFERENCES

1. Jack E. Triplett, The Theory of Hedonic Quality Measurement and Its Use in Price Indexes (Washington, D.C.: U.S. Government Printing Office, 1971).

2. Norman C. Dalkey and Daniel L. Rourke, Experimental Assessment of Delphi Procedures with Group Value Judgements, Report 612-ARPA (Santa Monica, California: RAND, 1971).

3. Dalkey and Rourke, Assessment of Delphi Procedures, p. 8.

4. N. C. Dalkey, "Quality of Life," in The Quality of Life Concept: A Potential Tool for Decisionmakers, an anthology of selected readings for the symposium sponsored by the U.S. Environmental Protection Agency, Office of Research and Monitoring, Environmental Studies Division, at Airlie House, Warrenton, Va., on August 29, 30, and 31, 1972.

5. John Oliver Wilson, "Quality of Life in the United States--An Excursion into the New Frontier of Socio-Economic Indicators" MRI Preprint (Kansas City: Midwest Research Institute, 1969).

SECTION IV
QOL: AN OPERATIONAL DEFINITION

IV.A Definitions

The definition of the QOL should focus on the relation between the conditions of life and how those conditions are experienced.

> "The QOL must be in the eye of the beholder and it is only through an examination of the experience of life as our people perceive it that we will understand the human meaning of the great social and institutional changes which characterize our time."[1]

The QOL is defined as a function of the objective conditions and subjective attitudes involving a defined area of concern. The key terms underlined above are defined as follows:

IV.A.1 Defined Area

Implicit in any discussion of the QOL is the notion of some area to which that QOL refers. Specification of that area is generally a political or bureaucratic decision. Representing an area statistically by sampling techniques is a scientific problem which will be of concern to us in Chapter VI when analytical problems and generalizations from QOL data are discussed.

IV.A.2 Objective Conditions

Objective conditions are defined as numerically measurable artifacts of a physical event (e.g. air pollution in parts per million of sulfer dioxide), sociological event (divorce rates, crime rates, number of ethnic minority persons, etc.), or economic event (local consumer price index, municipal budget, costs of highway construction, etc.). It is defined by any number which stands for a given quantity of a variable of interest so long as it is independent of subjective opinion and reliable (substantially the same number results every time the event is measured).

IV.A.3 Subjective Attitudes

Understanding the specific meaning of subjective attitude requires a more complex and lengthy discussion to avoid the confusion which often accompanies a concept used in many diverse contexts. Subjective attitude may be handled by eliminating several possible definitions which would, for reasons which shall be discussed, be inappropriate or unworkable in combination with the concept of QOL.

Values/Goals/Desires Dimension. Subjective attitude may be defined as dealing with valued states, goals, or desires. The idea of valued states, goals, and desires, is the focus of most popular conceptions of the QOL--high QOL might be a pristine wilderness, a Buick, being rich. a snowmobile in every garage, etc. Not only is the list lengthy and variable from person to person, it is fleeting. The new Buick owner soon "needs" a Cadillac and becomes "dissatisfied" with his Buick. Each new threshhold achieved is a basis for setting up new standards for needs and satisfactions. Values and goals are prone to paradoxes without appearing inconsistent in the mind of the perceiver--people want wilderness and isolation but also a store down the block to buy soda and bandaids. It is questionable if a study of values, goals, or desires can ever indicate a state of satisfaction or fail to produce results which simply augment present trends and tastes. These conceptual problems alone are sufficient warning that the values/goals/desires dimension is a difficult facet of subjective attitudes.

Social Perceptions. Subjective attitude should not be confused with social perceptions. Social perceptions may be defined as the impression one has of an event of physical condition in a context of meaning unique to the individual.

> Since an individual's perception is a function of his past history and his state at the moment he is viewing the stimulus, two individuals with different past experiences may look at the same . . . stimulus, . . . receive the same image, have the same image transmitted to the brain and yet perceive that image differently.[2]

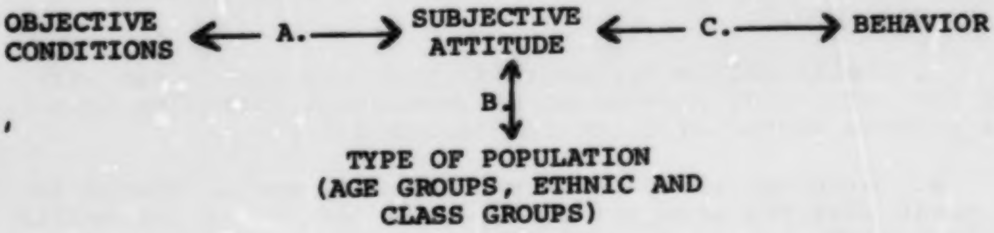
Experimental inquiry into the nature of perception indicates the considerable importance of general past history on the percept, such that straightforward reports of perceptions are not as informative of extant conditions as might be assumed.[3] According to Schiff, "It is erroneous to refer to a series of beliefs about environmental events not at the moment present, and not personally experienced by the respondent . . . as perception."[4]

Attitudes. An attitude may be distinguished from perception in that it is the interpreted understanding of the stimulus itself. It is not causally associated with a specific object or the processes of perception at any single moment but is an ongoing mental activity. Things have real effects if people believe them to be real and these beliefs may be products of many internal and external influences. Attitudes are products of life long experience with diverse psychological and sociological events. Although events or objects do not directly cause certain attitudes, repeated experiences or events known to an individual result in mental images and systematic beliefs over time. An attitude is said to be present when there is a disposition to act in a certain way relative to the object of the attitude.

Social psychologists define attitude as being composed of the following dimensions: (a) the affective dimension which includes feelings of life or dislike, satisfaction, indifference, or dissatisfaction; (b) the cognitive dimension which includes judgments, beliefs and evaluations; (c) the behavioral dimension which is a complex function of the affective and cognitive dimensions. As these two conditions are combined in a certain manner and achieve certain salience threshholds, behavior becomes more consistent and less random or arbitrary. Very strong attitudes are associated more definitively with specific kinds of behavior. There is a tendency to maintain a balance of affective and cognitive dimensions such that they are congruent and support each other (this is closely related to the theory of cognitive dissonance, an area of extensive social science research).

Attitudes may be inferred either from observed behaviors (the more reliable basis for inference about our attitude) or verbal disclosures over cognitive and affective components (the more practicable basis for inference about an attitude). Attitudes can be assessed from verbal disclosures in regard to both direction (polarity or affect) and magnitude (strength, degree or favorability of disclosure). The measurement of magnitude is believed to correspond increasingly to specific behaviors, i.e., a low magnitude of attitude (affect) would be only randomly associated with behavior.

Subjective attitude, as defined here, is primarily concerned with the affective and cognitive dimensions. It is specifically concerned with how these aspects of cognition vary as the objective conditions vary. The terms utilized in this discussion and the focus of much recent research can be characterized as follows:



The QOL definition developed in this report depends on an elaboration of the "A" relationship.[5] The "A" relationship corresponds to the key term "function" in the QOL definition and will be the focus of Section V. Later in Section V, which discusses analytical dimensions of the QOL, attention will be given to the "B" relationship and how "A" and "B" are meaningfully interrelated. Since little work has been done as yet with the relationship indicated by "C", it will not be discussed in this report.

IV.B Rules of Scope

The previous discussion defines QOL in detail so as to leave as little ambiguity as possible. Before an attempt is made to describe how the QOL is numerically determined, it is necessary to briefly treat objectives which remain despite the care exercised in generating the definition. Many arguments may be martialled to claim that the present definition is narrow or invalid. The rules of scope were established at the beginning of the QOL Team's activity which acted as constraints (as well as funnels) channeling the research in certain directions. The present definitions and following chapters should be evaluated within the boundaries of what has been attempted and what has been avoided. The following points set forth the guidelines used by the researchers in this report:

1. The problem was not approached from the perspective that a more equitable distribution of income necessarily leads to a higher QOL. Rather the team was concerned with those differences in quality of life which are found to be associated with income differentials and the facet of welfare orientations which concern itself with equality of opportunity structure insofar as such inequalities act to depress the possible QOL for some Americans.

2. The subjective intra-psychological elements of the QOL (e.g., fear, aggression, ambition, competition, love, etc.), were not included in the definition. Although these categories are interesting and undoubtedly relevant, it cannot be anticipated that meaningful empirical referents for these phenomena will be developed in a manner relevant to the public policy needs for which this work is intended to be utilized.

3. Political or bureaucratic problems associated with the idea of social accounting or government intrusion into the private sector will not be discussed.[6]

4. Although the pace of contemporary social change is so great that the argument may be made that it is impossible to define the QOL in a meaningful way, the validity of this argument cannot be determined.

5. Research in the area of "human development and character formation" indicates that a very large element of the QOL can be developed through improved environmental characteristics and childhood rearing practices. Certain expectation patterns and values passed on in childhood may facilitate or thwart the ease and degree of contentment with which individuals pass through life. However, this area is beyond the immediate interest of this report.

6. Armchair conceptualizations will not be considered systematically. Such an endeavor would require a massive inventory and critique of Utopian literature from Plato to Buckminster Fuller. At the same time aesthetic preferences and the area of philosophical issues inherent in this concept of QOL were avoided. There is a rather large body of literature on social values, their meaning and assessment, which is recognized as being of intrinsic interest but unmeasurable in any determined way for the purposes of this study.

7. Areas which fall outside of the operational definition for the QOL will not be considered, such as:

a. Aspects involved in subjective attitude disclosure but which are not readily apparent from survey data; for example, background experience and differential perception.

b. Factors which cannot be operationalized in the form of a subjective questionnaire format and an objective statistic of sufficiently rigorous and dependable a form as to be reliable and valid.

FOOTNOTES AND REFERENCES

1. Angus Campbell and Philip E. Converse, *The Human Meaning of Social Change* (New York: Russell Sage Foundation, 1972), p. 2.

2. Myra Schiff, "The Definition of Perceptions and Attitudes," in *Perceptions and Attitudes in Resources Management*, ed. by W. R. Derrick Sewell and Ian Burton, Research Paper No. 2, (Ottawa, Canada: Policy Research and Coordination Branch, Department of Energy, Mines and Resources, 1971), p. 7.

3. Marshall H. Segall, Donald T. Campbell and Melville J. Herskovitz, *The Infuence of Culture on Visual Perception* (Indianapolis: Bobbs-Merrill, 1966).

4. Schiff, *Perceptions and Attitudes*, p. 8.

5. A helpful guide has been Maurice D. Van Arsdol and Edward P. Radford, "Methods of Studying Social and Economic Effects of Environmental Agents on Groups," Department of Sociology and Anthropology, University of Southern California, mimeograph provided by Beth Olsen, EPA Fellow.

6. See the following for a discussion of these problems:

O. D. Duncan, "Discrimination Against Negroes," *Annal of the American Association of Political and Social Sciences*, vol. 371 (May, 1967), pp. 96-97.

Bertram M. Gross and Michael Springer, "A New Orientation in American Government," *Annals of the American Association of Political and Social Sciences*, vol. 371 (May, 1967), pp. 15-16.

Bertram M. Gross, *The State of the Nation: Social Systems Accounting* (London: Tavistok, 1966), pp. 138-141, 104.

Peter J. Henriot, "Political Questions About Social Indicators," *The Western Political Quarterly*, vol. xxii, no. 2 (June, 1970), pp. 235-55.

SECTION V
THE FUNCTIONAL RELATIONSHIP[1]

In keeping with the definition of life quality as a composite of objective conditions in a selected area and of the subjective attitude toward these conditions voiced by individuals residing in that area, a formula for the functional relationship between them is proposed which combines quantitative measures of objective and subjective variables in a potentially useful way. To date no serious attempts have been made to quantify QOL in a manner which includes both objective and subjective variables and the correlation between them.[2] As a consequence, the crude formula for this functional relationship presented here can only be viewed as a guide for future research. However, it does introduce several interesting features and concepts which have not previously been articulated.

The proposed quantitification scheme is based on the assignment of objective and subjective values to a series of variables which are called QOL factors (e.g. income, social participation, air quality, etc.). These factors (which are discussed in great detail in Section 6.0) have been selected partly because they can be objectively quantified in principle (though they have rarely been in fact). It is acknowledged that the list of factors which is used is by no means unique or absolutely comprehensive. However, it is felt that they at least provide a baseline for measuring QOL. The advantage of this quantification scheme is that factors can be added to or subtracted from the list without altering the methodology for computing a QOL index, though the value of the index may change slightly.

Assigning appropriate objective and subjective measures to each QOL factor is necessarily a central task in which little systematic research has been done. Section 6.0 discusses what seem to be appropriate objective indicators for each QOL factor (for example, the air quality indicator is a composite measure of air pollution characteristics). In some instances the objective measure is appropriate to a particular region (as in the case of air quality), in others it pertains directly to an individual (as in the case of income). Once objective measures have been obtained for each factor, they are, in the proposed formulation, transformed to a normal scale varying from one to ten in which the volume of one corresponds to the lowest, or least satisfactory measure (i.e. lowest QOL) and ten corresponds to the highest.[3] Clearly such a transformation requires that appropriate upper and lower bounds be established for each variable. Though difficult, and subject to potential criticism, this definition of boundaries is intrinsically achievable in our opinion. The transformation permits assignment of an objective measure, O_{ij}, to each factor, j. The measure is obtained for each individual, i, in the sample population (P).

For each objective measure, a corresponding subjective measure, S_{ij}, must be developed and is obtained for each individual, i, by asking him to rate his satisfaction with the objective measure for each factor, j. Again, a one to ten scale is used such that one corresponds to the lowest level of attitudinal satisfaction (i.e., dissatisfaction, dislike, unfavorability) and ten corresponds to the highest possible level of satisfaction. Obviously the anchoring of this subjective scale is open to some question. How, for example, does one define the greatest possible satisfaction with one's working conditions, or with the availability of wilderness areas? A substantial amount of social research is required to determine if the subjective scales can be bounded in a meaningful way.

An important point to emphasize is that the objective and subjective scales, because they measure different things, are not equivalent. In other words, a particular value on the objective scale is not equivalent to the same value on the subjective scale. Despite this fact, one would expect the objective and subjective ratings for a given factor j to be correlated across a selected population with P members. Computing, for example, a Spearman correlation coefficient, "r", for the jth factor:

$$r_j = 1 - \frac{\sum_{i=1}^{P} (O_{ij} - S_{ij})^2}{P(P^2 - 1)}$$

It is expected that r_j would be near one if the subjective measures for the selected population have any relation to the objective measures. An r_j near zero could result either from lack of significant association between the objective and subjective measures, or from the fact that the association is more complex (e.g. curvilinear) than the simple correlation procedure can measure. It may be that a more sophisticated test of correlation between O_{ij} and S_{ij} is needed. Since the objective and subjective measure are derived from completely independent sources, the correlation coefficient serves as an indication of the validity of the measurements for the jth factor, and thus of the acceptability of including that factor in a QOL index. It is anticipated that there will be considerable association between some factors and very little among others. At present no data exist to test this assumption and no clear theoretical perspectives suggest what associations can be expected. As data accumulate, it would be possible to delineate what associations exist and how to measure them, and hence to state specifically which factors should enter the QOL functional relationship.

There is one more input to the quantification procedure which must be discussed, the weight, W_{ij}, which the ith individual attaches to each factor, j. In addition to obtaining a subjective satisfaction level, three additional methods, discussed in Section 6.0 are recommended for determining factor importance weights.[4] Results from these independent determinations are first to be averaged and then ranked ordinally.[5]

To recapitulate, four specific inputs to our functional relationship for the quality of life are proposed for each QOL factor (j); and each individual in the sample population (i):

(1) O_{ij} - The objective measure of the factor for each individual, normalized to a 1-10 scale.
(2) S_{ij} - The subjective, or satisfaction measure of the same factor for the same individual, also normalized to a 1-10 scale.
(3) r_j - The correlation between O_{ij} and S_{ij} for the entire population.
(4) W_{ij} - The importance weighting which the individual attaches to the particular factor, relative to all other factors, on a rank order scale.

The next step is to combine these factors into a reasonable expression for the factor index, F_j, which describes the state of that factor and its importance.

It is necessary to carefully identify the population to be assessed for QOL. This population could be the whole sample population or some subset of it. In collecting data from individuals, information is also collected on ten standard population characteristics (age, sex, race, income bracket, geographic location, etc.). These data permit an ordering of the objective and subjective measures for all factors in a matrix against population characteristics, and hence an evaluation of the QOL for a variety of different populations. (This approach will be discussed more fully in Section 7.0.) For the moment, consider a particular region and the P members of the population in that region. Two averages may be computed for that population base:

$$\langle S_j \rangle = \frac{1}{P} \sum_{i=1}^{P} W_{ij} S_{ij}$$

$$\langle O_j \rangle = \left\{ \frac{1}{P} \sum_{1=1}^{P} W_{ij} \right\} \times \left\{ \frac{1}{P} \sum_{1=1}^{P} O_{ij} \right\}$$

In computing the average subjective measure for the population, each individual's subjective rating is weighted with his W_{ij} for that factor. On the other hand, when computing the average objective measure a slightly different approach is adopted. Because the objective measure is intrinsically less closely coupled to the weight each individual attaches to it, it is appropriate to compute the average objective measure for the population and multiply that with the average weight which the population attaches to the jth factor.[6]

Next, these averages are combined and multiplied with the correlation parameter to obtain the factor index for the jth QOL factor:

$$F_j = r_j \times \left\{ \frac{\alpha_j \langle O_j \rangle + \beta_j \langle S_j \rangle}{\alpha_j + \beta_j} \right\}$$

The parameters α_j and β_j are included in this expression to indicate that the average objective and subjective measure may not be of equal importance. For example, in the case of the health factor, the objective measures are likely to be considered most important; whereas for income, the subjective measure may well be the most significant. Because there is no well defined way to evaluate the emphasis parameters, α_j and β_j, it may be most reasonable to set both equal to one and perform a simple average of objective and subjective measures. This means that:

$$F_j = \frac{1}{2} r_j \times \langle O_j \rangle + \langle S_j \rangle$$

There are two especially significant features of this expression for the factor index:

- Both objective and subjective measures are included in a weighted fashion
- The combination of these measures is weighted with a correlation parameter which describes the association between these two measures.

When the correlation parameter is zero, indicating no significant relation between the objective and subjective measures for a particular factor, the $F_j = 0$, which is the desired result. The simple functional way in which r_j is incorporated into the expression for F_j is, of course, arbitrary, but it does at least provide the desired result. The maximum value which F_j can assume, given the normalized scales we have used for measures and weights, is ten.

An overall index for the quality of life can be generated by computing the mean of all M factors;

$$QOLI = \frac{1}{M} \sum_{j=1}^{M} F_j$$

It is not necessary to weight the factors again in this sum because weights have already been included in the computation of the factor indices. Use of the mean of factor indices seems more appropriate than just summing them because it constrains the final index to a 1 - 10 scale and avoids introducing major shifts in the total index if specific factors are added or dropped from consideration.

As an initial estimate of the QOL based on objective and subjective measurements the index generating formula given above is a promising point of departure. It has the advantage of varying toward zero if there exists no covariation between the two measures of the same underlying factor, thus avoiding the problem of an index generating numbers regardless of the underlying characteristics of what is being measured. It has the advantage of weighting the satisfactions by rank order of priorities and the objective condition by the average rank order given by persons residing in the community under study.

Under no circumstances should this formula be regarded as providing a perfect or immutable index of the QOL. It yields only a reasonable strategy by which research thinking can move to the next series of questions about the QOL, once data are available to show how the formula can be better expressed. The formula has several potential drawbacks including the likelihood that satisfaction and importance weighting are measures of the same thing.

Another potential difficulty is the strategy for determining $<S_j>$: is it to be done by comparing factors collectively or individually; and will weights be determined by the assessment of scale points across items with limited budgets which form comparisons, or with open scales such that the respondent can weight everything highly? Obviously much of the margin of error can be a part of the operational strategy for determining either subjective or objective measures.

Finally, the political usage of the QOL Index should be questioned. Obviously it is not reasonable to govern people based on their satisfactions with levels of air quality which will kill them. With the matter of qir quality the judgment is comparatively simple, but what about job satisfaction? Can people or the government determine the relative weights which might be attributed to these areas which this formula? The matter may in the end become a political problem again--and there may be no escape for the decision maker from assuming the responsibilities inherent in this game.

The formula developed above has a distinct advantage in that it alerts the user to the important question without offering a cloaked answer--e.g., one which seems determinate and a "good" answer for policy purposes but which is invalid as a reflection of actual conditions and public sentiment. The important question is not what is a numerical analogue to the QOL but what is the relationship between objective measures of a condition and people's assessment of those conditions.

FOOTNOTES AND REFERENCES

1. We would like to acknowledge the technical assistance of Dr. Robert W. Shaw, Jr., Booz, Allen Applied Research, Inc., Bethesda, Md. Dr. Shaw assisted in the technical writing and presentation of the QOL formula and description.

2. The only other QOL index which has come to our attention is J. Alan Wagar's quality of living index:

$$QL = \frac{\Sigma \text{ production} - \Sigma \text{ losses}}{\text{population}} + \frac{\text{services/time}}{\text{population}} + \frac{\text{experiences/time}}{\text{population}}$$

Wagar's point is that current emphasis on material production will shift to services which will shift to the quality of experiences all of which atrophy with growth.
"Growth Versus the Quality of Life," Science, Vol. 168 (June, 1970), pp. 1179-1184.

3. This linear transformation is equivalent to that discussed in the Battelle Report (1972).

4. Several strategies exist to determine weights including an interesting "amenity trade off" game in which "participants are asked to allocate a certain sum of money to improve various amenities in their neighborhoods and to write these preferences against their evaluation of existing conditions," reported by Timothy O'Riordan, "Public Opinion and Environmental Quality," Environment and Behavior, June, 1971, pp. 191-214.

5. There are some indications that importance and satisfaction ratings may measure the same thing and, hence, that the information contained in S_{ij} and W_{ij} may be redundant. This possibility was pointed out by Dr. Frank Andrews, Program Director of the social indicator section of the Urban and Regional Studies Division of the Institute of Survey Research, Ann Arbor, Michigan. Analysis of data collected by Dr. Andrews' group as part of a study on life satisfaction casts some doubt on the ability to distinguish satisfaction and importance, though the results are not yet conclusive. For the present, the concept of importance weighting shall be retained.

6. It should be noted that there is no theoretical base to justify the distinction between the subjective and objective averages. The choice is purely arbitrary, and is based primarily on intuition about the relation between the weights and the measures. If subsequent research indicates the necessity, the procedure should be changed.

7. For example, where and when is air pollution measured? It makes a great deal of difference on the subjective measure since the individual is defined as the psychophysiological arbiter of these objective conditions.

SECTION VI
QUALITY OF LIFE FACTORS

VI.A Introduction

The essence of this section is to discuss the merits of a suggested list of quality of life (QOL) factors for use as a guide in developing representative indicators. Generating a workable list of indicators is a primary step toward the eventual measurement of QOL.

Though the thesis of the QOL argument is that valid QOL measurement requires the use of both objective and subjective indicators, only the former are given in the text of this section. A discussion of an approach toward obtaining a representative list of subjective indicators, including examples, will be found as Appendix B of this report.

VI.B Definition of Terms

The following terms are used in this discussion in a restricted or special sense:[1]

A parameter is a characteristic of the system being analyzed. In developing an acceptable QOL index, parameters must be found which can be measured efficiently and are characterizations of important states of the system.

A factor is an attribute or characteristic of society or of the environment which affects at least some people's quality of life. A factor is thus a parameter of a special kind: one which directly affects the QOL, but need not itself be directly quantifiable. Some factors may not be measurable, but are included in this discussion irrespective of their current suceptability to measurement. A factor-list is a conceptual, rather than an operational tool of analysis; it should aim at comprehensiveness, so that more restricted operational lists are clearly seen only as approximations of the QOL.

An indicator is a parameter which has a high correlation to an important condition which is less easily measurable. Indicators are operational, not conceptual tools. An indicator need not causally affect the QOL, as must a factor, but it must be a number of some kind: expressed in percent, parts per million, dollars, or some other unit. Further methodological requirements for indicators will be cited later in this discussion.

An index, like an indicator, is a number whose value tells us a measure of the relative magnitude of some condition. Unlike an indicator, however, an index need not directly measure a factor. Indexes may be combinations of indicators designed to simplify the measurement of a factor: e.g., an air quality index combines several indicators, so that the concentration of several kinds of particles are summarized in one number.

A sector is a class of factors which are felt to have some important aspects in common. Sectors are ways of grouping factors to simplify discussion. This report considers six such sectors: Economic Environment, Social Sector, Physical Environment, Political Environment, Natural Environment, and Health.

In discussing the causal relationships between parameters, the words "input" and "output" are used in a special sense. An input of a factor is a parameter that causes the value of that factor to vary. (For example, occupational dangers are inputs to work satisfaction.) An output of a factor is a parameter, usually an indicator, which is affected by that factor. (For example, labor turnover is an output of, among other parameters, work satisfaction.) Sub-factors include such inputs and outputs of factors: a sub-factor is a parameter which is an element of a factor. Sub-factors are useful in clarifying the meaning of factors and in eliminating overlaps between them.

To summarize: Factors and indicators are two sets of parameters, the first directly affecting some people's QOL, and the second measuring the factors. Some words, such as "income", represent both a factor and an indicator, since they are parameters which can be said to measure themselves. Indexes are numbers which may either directly measure factors (such indexes are in fact indicators), or may combine indicators into multi-dimensional aggregative numbers. To clarify the meaning of factors, sub-factors were identified which include both inputs and outputs of that factor. Sectors, on the other hand, are larger sets of factors chosen to simplify the discussion of the QOL.

VI.A.2 Factors: Work by Others

While any parameter that affects the QOL is a factor, further criteria are clearly needed in order to isolate a list of factors to construct a QOL index. Three such criteria for a QOL factor-list are used here: value-dimensionality, comprehensiveness, and commonality.

Value-dimensionality means that two levels of a given factor must correspond to different levels of desirability for a large group of individuals. This would exclude a factor such as "securities portfolios", because one portfolio cannot arbitrarily be considered better than the next. One can look at the total wealth a person holds, (on the assumption that more wealth is better), but the way in which a person allocates his wealth corresponds to his/her own preference structure. Only factors for which "more is better" or "less is better" or some level is in principle optimal can be included in a QOL factor-list.

Comprehensiveness means that, all things being equal, a QOL factor-list that covers all areas of the QOL is better than one which does not. This criterion may seem obvious, but seems to have been ignored by several previous studies.

Commonality means that a level of a QOL factor must apply to many individuals at once. Purely personal factors such as "ambition" do not meet the test of commonality. A QOL factor-list based on non-communal factors, as will be demonstrated later in this discussion, has little or no policy usefulness.

There remains considerable room for disagreement over what is a superior factor-list. Table 1 presents lists of factors of 10 authors and demonstrates the fact that one person's factor-list is bound to be different from that of another.[2]

One way in which the studies can be differentiated is by the degree to which they equate QOL with a number of purely subjective personal characteristics (one extreme), and with a number of objective indices (the other extreme). The first pole is represented by Dalkey and Rourke[3] who present a set of "QOL factors" including peace of mind, novelty, privacy, egoism and love. One might say that these are the products, rather than the factors, of the QOL. They are not directly controllable by policy-makers, but rather are to some extent the results of their actions through a complicated and unknown series of causal links. Since these links are so poorly understood, the usefulness of a QOL index defined the way Dalkey and Rourke suggest is severely limited. The opposite extreme is represented by Flax[4] who presents thirteen quality "categories", and attaches to each an objective social indicator. Examples of his categories are unemployment, housing, health, transportation and "community concern". Flax "measures" the latter category by citing per capita contributions to the United Fund. Flax's study, despite some real merits in other respects, suffers from a lack of comprehensiveness. Not only is there no attempt to "weight" the categories against each other, but there is the possibility that whole areas of measurable and controllable QOL categories have been missed.

A second dimension spanned by our compilation of factor-lists is that between comprehensive sets of factors and/or indicators, and factor-lists seeking only to describe a limited group of QOL aspects, such as "environmental quality". The list of the San Diego Environmental Development Agency (EDA)[5] for example, is part of research on the environment, in a fairly narrow sense of the term. As the San Diego authors point out,[6] the environment surrounds and "acts upon" communities and organisms, whereas quality of life involves social, economic, and cultural factors not covered by their study. At the other extreme, the list of factors devised by the Community and Environment Assessment Committee (CEAC) in Raleigh, North Carolina,[7] is comprehensive, but redundant and internally contradictory.

TABLE 1
COMPARISON OF QOL FACTOR LISTS[1]

EPA FELLOWS (1972)	PERLOFF (1969)	[illegible] IN SHELDON & MOORE, pp. [illegible]	COMMUNITY AND ENVIRONMENT ASSESSMENT COMMITTEE (1972)	DALKEY & ROURKE (1971) p. 12	REPORT OF THE WHITE HOUSE CONFERENCE ON YOUTH: INDIVIDUALISM (1971)	GROSS & SPRINGER (1967) pp. 4-5	SON (1972) pp. 3-
			PERSON DISSATISFACTION PAST LIFE EVENTS EXPECTED LIFE EVENTS DEMOGRAPHIC VARIABLES (AGE, RACE, SEX) LABOR FORCE & COMMUNITY PARTICIPATION STATUS EXPECTATION ORGANIZATIONAL HOUSEHOLD (3) STATUS INCONGRUITY SOCIAL STATUS INDEX LIFE CYCLE TYPOLOGY DISPOSABLE INCOME TOTAL CONSUMPTION OF GOODS & SERVICES HEALTH	PSYCHOLOGICAL ASPECTS FEAR/ANXIETY AGGRESSION AMBITION COMPETITION DOMINANCE/SUPERIORITY ACQUISITIVENESS COMFORT NOVELTY ETC.	INDIVIDUALISM	INDIVIDUAL AND GROUP VALUES INTENSITY OF COMMITMENT TO PARTICULAR VALUES AND BELIEFS	VIDUAL STATUS
ECONOMIC ENVIRONMENT WORK SATISFACTION INCOME INCOME DISTRIBUTION ECONOMIC SECURITY	WORK PLACES SAFETY AMENITIES WORK CHALLENGE	WELFARE BENEFITS PUBLIC ASSISTANCE AND RELIEF UNEMPLOYMENT OLD AGE AND RETIREMENT DISABILITY AND PENSION ALLOWANCES	ECONOMIC BUSINESS INDICATORS NEIGHBORHOOD MEDIAN INCOME ABSENTEEISM TURNOVER RETAIL SALES COST OF LIVING UNEMPLOYMENT		INCOME & ECONOMIC SECURITY AGGREGATE ECONOMIC ADVANCEMENT PRODUCTIVE EMPLOYMENT AREAS EMPLOYMENT AND PRODUCTIVITY		ONOMIC GROWTH LFARE (2)
POLITICAL ENVIRONMENT INFORMED CONSTITUENCY CIVIL LIBERTIES ELECTORAL PARTICIPATION NON-ELECTORAL PARTICIPATION GOVERNMENT RESPONSIVENESS			POLITICAL/GOVERNMENTAL AWARENESS OF MATTERS OF GOVERNMENT OPENNESS TO POWER RESPONSIVENESS TO PUBLIC		JUSTICE, FREEDOM LIVING ENVIRONMENT	DISCRIMINATION AGAINST NEGROES CIVIL LIBERTIES THE MASS MEDIA (APPRAISALS OF DEPTH REPORTING) ELECTORAL PARTICIPATION	IVIDUAL EQUALITY TE AND LOCAL GO RMED AND INVOLV CITIZENRY FESSIONALISM
PHYSICAL ENVIRONMENT HOUSING TRANSPORTATION MATERIAL QUALITY PUBLIC SERVICES AESTHETICS	HOUSEHOLD SHELTER HOUSING CONDITION CROWDING RATS, ROACHES, OTHER PESTS PLUMBING HOUSEHOLD EQUIPMENT TRANSPORTATION UTILITIES TRANSPORTATION WATER SUPPLY SEWERAGE SOLID WASTE DISPOSAL ELECTRICITY GAS TELEPHONE OTHER COMMUNICATION	PHYSICAL ENVIRONMENT (4) & UTILITIES HOUSING (URBAN RENEWAL, PUBLIC HOUSING) PHYSICAL ENVIRONMENT (HIGHWAYS, WATER, UTILITIES)	HOUSING TYPE RESIDENTIAL STABILITY DENSITY AVAILABILITY				CHNOLOGICAL CH VING CONDITIONS G. ALLEVIATING G POVERTY)
SOCIAL ENVIRONMENT COMMUNITY SOCIAL STABILITY CULTURE PHYSICAL SECURITY FAMILY SOCIALIZATION RECREATION	COMMUNITY NEIGHBORHOOD COMMUNITY CHARACTERISTICS SERVICES ENVIRONMENT	REGULATION & SAFETY RECREATION & CULTURE NATIONAL DEFENSE HUMAN RESOURCE DEVELOPMENT EDUCATION HEALTH	SOCIAL/CULTURAL SOCIAL DISORDER VALUE CONSENSUS SOCIAL INVOLVEMENT COMMUNICATIONS		GENERAL HEALTH TRAINING, EDUCATION AND CULTURE	CRIME AND DELINQUENCY	UCATION
HEALTH PHYSICAL MENTAL ENVIRONMENT			POPULATION BIRTH RATE DEATH RATE				ALTH (2)
NATURAL ENVIRONMENT AIR QUALITY WATER QUALITY RADIATION SOLID WASTE TOXICITY NOISE	SPATIAL ENVIRONMENT UNDERGROUND SPACE UNCOVERED LAND COVERED LAND RADIOSPECTRUM SPACE AIRWAYS SPACE NATURAL ENVIRONMENT OPEN SPACE RECREATION AIRSHED WATERSHED QUIET AND NOISE ZONES MICRO-CLIMATE ZONES SUNLIGHT EXPOSURE OLFACTORY ZONE	PHYSICAL ENVIRONMENT (4) & UTILITIES: AIR CONSERVATION DEVELOPMENT OF RESOURCES	NATURAL ENVIRONMENT POLLUTION METEOROLOGICAL VARIABLES NATURAL RESOURCE AVAILABILITY		NATURAL ENVIRONMENT	NATURAL ENVIRONMENT STREAMS ESTUARIES LAKES AIR ABOVE METRO AREAS SOLID WASTES	
		SPACE GENERAL GOVERNMENT GENERAL GOVERNMENT INTERNATIONAL AFFAIRS & FINANCE	POLITICAL/GOVERNMENTAL GOVERNMENT FISCAL ACTIVITY GENERAL SERVICES SUPPLY DEMAND UTILIZATION POPULATION MIGRATION			URBAN CONDITIONS INTERNAL MIGRATION EMPLOYMENT DATA SEGREGATION DATA	RICULTURE

FOOTNOTES:

1. THE 10 "SOCIAL GOALS CATEGORIES" OF DR. N.E. TERLECKYJ (1972) ARE NOT INCLUDED IN THIS CHART. TERLECKYJ'S LIST, WHILE CORRESPONDING CLOSELY TO THE EPA FACTORS, CAME TO OUR ATTENTION WHEN THE FINAL DRAFT OF THIS MANUSCRIPT WAS BEING PREPARED.

2. "HEALTH" AND "WELFARE" WERE CLASSIFIED BY WILSON TOGETHER AS "HEALTH AND WELFARE." THEY HAVE BEEN SEPARATED TO PARALLEL THE EPA LIST.

3. THE "HOUSEHOLD" CATEGORY OF THE CEAC MEETING INCLUDES ELEMENTS THAT PAR EPA "ECONOMIC ENVIRONMENT" SECTOR AND OTHERS THAT PARALLEL NO FACTORS IN FELLOWS LIST. THIS FACT IS INDICATED BY THE POSITIONING OF THE "HOUSEHOLD" CATEG TABLE.

A

Preceding page blank

TABLE 1

COMPARISON OF QOL FACTOR LISTS[1]

DALKEY & ROURKE (1971) p. 12	REPORT OF THE WHITE HOUSE CONFERENCE ON YOUTH INDIVIDUALISM (1971)	GROSS & SPRINGER (1967) pp. 4-5	WILSON (1972) pp. 3-4	SAN DIEGO ENVIRONMENTAL DEVELOPMENT AGENCY (1973) p. 10	FLAX (1970) p. 9	OFFICE OF MANAGEMENT & BUDGET (1973)
PSYCHOLOGICAL ASPECTS FEAR/ANXIETY AGGRESSION AMBITION COMPETITION DOMINANCE/DEPENDENCY AGGRESSIVENESS COMFORT NOVELTY ETC.	INDIVIDUALISM	INDIVIDUAL AND GROUP VALUES INTENSITY OF COMMITMENT TO PARTICULAR VALUES AND BELIEFS	INDIVIDUAL STATUS			
	INCOME & ECONOMIC SECURITY AGGREGATE ECONOMIC ADVANCEMENT PRODUCTIVE EMPLOYMENT AREAS EMPLOYMENT AND PRODUCTIVITY		ECONOMIC GROWTH WELFARE (2)		INCOME UNEMPLOYMENT POVERTY	EMPLOYMENT WORK ENVIRONMENT AND JOB SATISFACTION EMPLOYMENT OPPORTUNITY INCOME LOW INCOME POPULATION INCOME DISTRIBUTION LEVEL OF PERSONAL INCOME
	JUSTICE, FREEDOM LIVING ENVIRONMENT	DISCRIMINATION AGAINST NEGROES CIVIL LIBERTIES THE MASS MEDIA (APPRAISALS OF DEPTH REPORTING) ELECTORAL PARTICIPATION	INDIVIDUAL EQUALITY STATE AND LOCAL GOVERNMENT INFORMED AND INVOLVED CITIZENRY PROFESSIONALISM		RACIAL EQUALITY COMMUNITY CONCERN CITIZEN PARTICIPATION	
			TECHNOLOGICAL CHANGE LIVING CONDITIONS (E.G. ALLEVIATING GENERAL POVERTY)		HOUSING TRANSPORTATION	HOUSING AND PHYSICAL ENVIRONMENT HOUSING AND QUALITY OF LIVING CONDITIONS NEIGHBORHOOD QUALITY ENVIRONMENTAL QUALITY
	GENERAL HEALTH TRAINING, EDUCATION AND CULTURE	CRIME AND DELINQUENCY	EDUCATION	SOCIAL/AESTHETIC HOUSING ADEQUACY VISUAL AND AESTHETIC CHARACTERISTICS PESTS	PUBLIC ORDER EDUCATIONAL ATTAINMENT SOCIAL DISINTEGRATION	EDUCATION BASIC SKILLS FOR EVERYONE OPPORTUNITY FOR ADVANCED LEARNING LEISURE AND RECREATION TIME AVAILABLE PARTICIPATION PUBLIC SAFETY/LEGAL JUSTICE SAFETY OF LIFE AND PROPERTY FROM CRIME EQUITABLE CRIMINAL JUSTICE
			HEALTH (2)		HEALTH MENTAL HEALTH	HEALTH LONG LIFE PHYSICAL AND MENTAL WELL-BEING
	NATURAL ENVIRONMENT	NATURAL ENVIRONMENT STREAMS ESTUARIES LAKES AIR ABOVE METRO AREAS SOLID WASTES		AIR AND WATER RELATED AIR QUALITY WATER QUALITY NOISE MULTI-MEDIA RELATED HAZARDOUS SUBSTANCES SOLID WASTE	AIR QUALITY	
		URBAN CONDITIONS INTERNAL MIGRATION EMPLOYMENT DATA SEGREGATION DATA	AGRICULTURE	LAND-RELATED LAND USE/LAND USE SHIFT RECREATIONAL RESOURCES WILDLIFE & NATURAL VEGETATION NATURAL RESOURCE DEPLETION		POPULATION POPULATION LIVING ARRANGEMENTS FAMILY STRUCTURE

ARE" WERE CLASSIFIED BY WILSON TOGETHER AS "HEALTH AND WELFARE"
TO PARALLEL THE EPA LIST

3. THE "HOUSEHOLD" CATEGORY OF THE CEAC MEETING INCLUDES ELEMENTS THAT PARALLEL THE EPA "ECONOMIC ENVIRONMENT" SECTOR AND OTHERS THAT PARALLEL NO FACTORS IN THE EPA FELLOWS LIST. THIS FACT IS INDICATED BY THE POSITIONING OF THE "HOUSEHOLD" CATEGORY IN THE TABLE.

4. NSBS CATEGORY "HOUSING, ENVIRONMENT AND UTILITIES" HAS BEEN SPLIT INTO TWO PARTS TO PARALLEL THE EPA FELLOWS LIST OF FACTORS.

oceding page blank

D

Other studies, some of which are only secondarily QOL analyses, should also be cited. Wilson[8] presents a set of nine areas of concern to the Commission on National Goals. The areas include individual equality, education, agriculture, living conditions, and economic growth. The White House Conference on Youth and Individualism[9] presents a similar list, whose areas are only vaguely defined and are merely a confirmation of the present areas of government expenditures. The latter fault is shared by the categorization of government expenditures given by Moss in Sheldon and Moore.[10] Since a QOL index is meant to be a measure of the effectiveness of of government activities, a list of QOL factors that merely reflects the range of those activities would accomplish little more than justify the status quo. Gross and Springer,[11] in a general discussion of the need for better social statistics, make some worthwhile suggestions of ways to measure progress in such areas as civil liberties and electoral participation. Their list, however, was not meant to be, and is not, a comprehensive set of QOL factors. The Office of Management and the Budget[12] also presents a list of indicators which is similarly overly narrow. Perloff[13] suggests a "framework for evaluating policy measures for the environment" which, perhaps, comes closest to an ideal list of QOL factors.[14] His six large categories (e.g., the natural environment, the spatial environment, household shelter, workplaces) are subdivided into a number of specific "elements in the environment", the quality of which can be objectively evaluated.

VI.A.3 Factors: Study Methodology

The method used for generating QOL sectors, factors and sub-factors for this study was both inductive and deductive. First, each team member listed the factors he or she believed should be part of any QOL index. Second, factors were grouped into larger sectors, each uniting a number of factors into a logical and non-redundant rubric. Third, on the basis of a reading of the QOL literature, new factors were generated under each of the sector headings.[15] Fourth, each of the factors were broken down into sub-factors in an attempt to clarify the meaning of each factor, and to detect redundancies between factors. Such redundancies are undesirable because in the final QOL index they would cause double-accounting. If all of the sub-factors of one factor were also listed under the heading of another factor, the former factor was eliminated. In cases of partial redundancy, factors were re-defined to eliminate such overlaps. Finally, another search was made of the relevant literature to further refine the list of factors. The final factor set is shown in Table 2 under six major headings.

Preceding page blank

TABLE 2

QUALITY OF LIFE FACTORS*

Major Factors	Objective Indicators (Examples)**
1. Economic Environment:	
Income	-Per capita disposable income -Median family income
Income Distribution	-Gini coefficient of income distribution
Economic Security	-Income support -Wealth measures
Work Satisfaction	-Accident, productivity, and turnover rates
2. Social Sector:	
Family	-Marriage and divorce rates -Illegitimate births
Community	-Social Responsibility Scale
Social Stability	-Upward social mobility -Social disorder incident rates
Physical Security	-Violent crime rates
Culture	-Human effort directed toward the arts
Recreation	-Persons participating in outdoor recreation and average days per person

*Examples of the methodology for determining subjective factors is given in Appendix B.

**This is not intended to be an exhaustive listing.

TABLE 2 (Continued)

QUALITY OF LIFE FACTORS

Major Factors	Objective Indicators (Examples)
3. Political Environment:	
Electoral Participation	-Per cent of registrants voting
Non-Electoral Participation	-Bloomberg & Rosenstock's "Action Score"
Government Responsibility	-Budget allocations -Per capita distribution of funds
Civil Liberties	-Rights Commission -Citizen review board
Informed Constituency	-Content analysis of mass media
4. Health:	
Physical	-Infant mortality rate -Physicians/capita -Health care facility utilization
Mental	-Persons in mental hospitals/ population -Per cent of patients "cured"
Nourishment	-Per capita consumption of food types -Nutrients consumed per day per capita

TABLE 2 (Continued)

QUALITY OF LIFE FACTORS

Major Factors	Objective Indicators (Examples)
5. Physical Environment:	
Housing	-Per cent deteriorated houses -Per cent lacking plumbing -Per cent overcrowded
Transportation	-Family costs -Per cent budget allocated to construction and maintenance
Public Services	-Cost of gas and electricity -Frequency and coverage of services
Material Quality (both goods & services)	-Product life -Automobile recalls -Cost and frequency of repairs
Aesthetics	-Litter; Billboards -Trees preserved and planted
6. Natural Environment:	
Air Quality	-People exposed to sub-standard conditions -Concentration of CO, NO_2, SO_2
Water Quality	-BOD; Coliform count -Turbidity; Temperature; pH
Radiation	-Amount of radioactivity in water, soil, people
Toxicity	-Lead concentrations -Cases of lead poisoning
Solid Wastes	-Pounds/capita -Amount recycled -Frequency of collection
Noise	-Community Noise Reference Scale (under development)

VI.B.1 Economic Sector

VI.B.1.1 Introduction

The economic environment may be defined as those aspects of the QOL that deal with the magnitude, continuity, and distribution of people's incomes, and with the welfare (or "ill-fare") generated in the process of attaining those incomes. The following factors have been identified as being part of the economic environment:

Income
Income distribution
Economic security
Work satisfaction.

This section will define and justify the choice of each of these factors, and will discuss the means of measuring the factors with objective indicators.

VI.B.1.2 Income

The most important factor in the economic environment sector is a broadly defined per capita "income" factor. The justification for including this factor is that the welfare of nearly all individuals depends on the existence of material goods. If an individual decides to forego a certain amount of consumption by investing some of his/her income, it is presumably because the investment will yield a greater amount of income in the future. The relevant factor, then, is income, and not wealth or capital. It is recognized, however, that a national income figure, no matter how carefully modified, will never be the same as welfare per se and certainly not the same as the QOL.[16]

Objective Indicators. The Department of Commerce regularly publishes very complete data on the money income of individuals in the United States. Two indicators are of prime importance for this factor: (1) per capita disposable income, adjusted for changes in the consumer price index; and (2) median family income.[17] Disposable income is the income left over after taxes, and, for the purpose of this study, is therefore more appropriate than gross income, because we are interested in the money the individual has available for private goods. Median family income would be more appropriate if the unit of analysis were the family, rather than the individual. It must be borne in mind that such a choice would be biased against large families, and therefore presumably against the poor.

VI.B.1.3 Income Distribution

Income distribution is included in the factor list because it is assumed that many people see a certain amount of equity as being good of itself. This assumption is supported by the long history of proposals to reform the distribution of income, all based on grounds of equity, and all receiving support from significant groups of people. A simple and convenient way to express the amount of inequity is by plotting a Lorenz curve.[18] In Figure 2, each percentage of the population is paired with a certain percentage of aggregate income (defined above). The horizontal axis is ranked from the poorest to the richest. In this case, the bottom 45 percent of the population receives 19 percent of aggregate income. The 45-degree line represents complete equality. Therefore, the area between the two curves, divided by the area below the diagonal, gives the "Lorenz coefficient of inequality".[19] What coefficient is optimal is, of course, a value judgment that can be determined by surveying the public. It is evident, however, that the utility function of equity would be peaked: i.e., beyond a certain point, most people would find an added increment of equity undesirable. This may make it difficult to fit this factor onto a bipolar scale, in which the minimum number is considered "worst" and the maximum number "best".

Objective Indicators. Income distribution essentially involves the same data as the "income" factor, and therefore is limited in its present "measurability" to about the same degree. The Bureau of the Census provides sufficient data to derive a Lorenz curve based on money income.[20] The difficulties with such data are: (1) Time income and time costs are not covered (although one could perform Sametz's kind of estimation using data on differing work-weeks). (2) The data should be adjusted for cross-sectional variations in the cost of living, but such data is only partly available. (3) Cross-sectional differences in social costs are similarly not covered. Nevertheless, the existing indicators are sufficiently complete and easy to combine such that the income distribution factor can be approximated by the Census Bureau data.

VI.B.1.4 Economic Security

Economic security is defined as the security the individual has against sudden loss of his or her regular source of money income. This security may come in a number of forms; for the purpose of this study it seems sufficient to recognize two main forms: personal wealth and income support.

The justification for economic security being a factor is that most people seem to desire it. This is evidenced by the age-old tendency to hoard wealth, by the existence of insurance companies, and by legislation designed to provide such security. If everyone's private income were sufficient to provide economic security it would be arguable that the factor is superfluous, since it would appear to be covered by the "income" factor. Since, however, many people depend on publicly provided income support, the factor seems to be conceptually distinct from "income" per se.

Objective Indicators. Two sub-factors were recommended above as ways of "getting at" economic security. The first, data on income support, can be estimated by Commerce Department data[21] as well as the records of Congress showing how much the Federal government has allocated to income support. The amount of publicly provided income support is broken down by data in the HEW publication, Welfare in Review.[22]

Data on personal wealth was compiled for 1962 by the Internal Revenue Service for those with wealth exceeding $60,000.[23] This data is relevant to economic security because the wealthy are generally not eligible for government income support. It is not clear, however, how this data should be combined with average receipts of income support to arrive at a single index of economic security.

VI.B.1.5 Work Satisfaction

Work satisfaction is defined as the value of the amenities, minus the value of the disamenities, associated with an individual's job. Different authors have presented differing lists of sub-factors for work satisfaction; Kahn[24] is representative with his list: occupation status, supervision, peer relationships, job content, wages and other extrinsic rewards, promotion, and physical conditions. "Wages" is omitted from our list because it clearly would overlap with the "income" factor. Otherwise, the list provides a good approximation of what is meant by the term, "work satisfaction".

Work satisfaction is included as a factor because a good part of most adults' day is spent at a job, so that the amenities and disamenities of the job have a considerable effect on their quality of life. Evidence for this contention can be found by studying differences in wages offered by firms of the same industry. Ceteris paribus, these wage differentials may be taken to be offsetting incentives for workers to choose one firm over another.

Objective Indicators. This factor is hard to measure in objective terms. All that is available are surrogate measures, the validity of which are open to serious question. One "input" to work satisfaction is exposure to work hazards, which in turn is measurable to some extent by accident rates available from BLS.[25] But it is only one input, and therefore is suspect as a surrogate variable. It can be argued that job effectiveness (productivity) and labor turnover rates are "outputs" of work satisfaction, the first varying directly as work satisfaction increases; the second varying inversely. One suspects, however, that both are functions of other variables as well, and therefore, are not very reliable as indicators of this factor. For what they are worth, both are available from BLS.[26]

VI.B.2 Social Sector

VI.B.2.1 Introduction

A major consideration in the development rationale for the treatment of the social sector is that of stability--both in an individual, and in a societal sense. Such stability, or lack there of, may be considered the general end-result of the integrative ability of various social units (from the individual, to the nuclear family unit, the secondary interest group, and finally to the polity).

Below are listed those factors considered to best encompass the broad scope of the social environment as defined by this research:

1. Family
2. Community
3. Social Stability
4. Physical Security
5. Culture
6. Recreation

VI.B.2.2 Family

The family, according to Sussman is "still a viable social system".[27] For a long time socialization has been one of the main activities of the family system. The family develops, through its kinship network, roles and identities that separate it from other families. Family units in general are constantly involved in maintaining their integrity as viable social units.

The persistent pattern of the American family has been organization into nuclear units who "voluntarily choose to participate within a kin network, based on exchange and reciprocity, which is composed of other nuclear units living in separate households".[28]

The basic structure of the family unit is undergoing some dramatic changes in certain instances. Sussman talks about "dual-career" families and notes that not only is the role of the nuclear family changing due to this type of family structure, but that another type of family unit is evolving and becoming more prevalent in society. The "anti-Traditional" nuclear family structure, resembling the classic extended family in eighteenth-century America, is becoming increasingly attractive to young Americans, and will, according to Sussman, have a tremendous "impact upon the traditional nuclear family's role structure, social and physical space needs, socialization patterns, value systems, and ideology".[29]

Threatened by disintegrative social forces, such as increased job mobility, and necessity of moving the family from place to place, family units are constantly involved in trying to maintain their integrity as viable social units. Toffler has suggested the possibility that dramatic changes in human reproductive "technology" will lead to a total restructuring of the family life cycle.[30]

Objective Indicators. There are statistical data available which indicate roughly certain changes in the family life cycle. Glick examined the change, over time, in these stages of the family life cycle: first marriage, birth of last child, marriage of last child, death of one spouse, death of the other spouse.[31] These figures elucidate the changes in amounts of time devoted to certain family functions (e.g. child raising, time spent alone together before and after raising children).

Also important in the analysis of the family are marriage and divorce rates, percent of divorces with children involved, percent of married women with husbands absent, and percent of live births illegitimate. Some combination of this data would give us an indication of the relative stability of a community, neighborhood, or the nation. It would also prove valuable to find any correlations that might exist between life-cycle change and change in nuclear family structure on one hand, and family instability on the other.

VI.B.2.3 Community

Cantril described his classic study on human concerns as an attempt "to uncover the limits and boundaries to aspirations set by internalized social norms, by all the group identifications that people learn in their particular social milieu and that serve as subjective standards for satisfaction or frustration".[32]

That Americans have certain general fears and aspirations at any point in time is accepted. These fears and aspirations are related to certain societal norms, among them that of the need to "belong and be accepted".

Rossi has made an exhaustive study of community social integration and talks at length about perception of locality as a collectivity, affective involvement in residential locality, and interest and involvement in local events (the existence of locally-based and oriented voluntary groups).[33] Among these groups are professional associations and unions (which provide an organized collectivity for purposes of work protection and assurance of professional integrity); religious associations (enabling concerted expression of mutual religious beliefs); and restricted purpose "leisure" activity associations (e.g. country clubs and other leisure groups). The types of groups to which one belongs will, in many cases, indicate the type of community or neighborhood structure and its varying pressures for conformity to generally accepted norms.

Objective Indicators. Perhaps the most germane measurement of community stability and individual participation in the life of the community is the Social Responsibility Scale of Berkowitz and Lutterman.[34] This scale attempts to assess a person's traditional social responsibility, and orientation toward helping others even when there is nothing to be gained from them.

VI.B.2.4 Social Stability

The area of social stability, as researched, has been approached primarily from the aspect of community solidarity. Specifically, what are the major divisive points among the community's citizenry, and at what point is the possibility of community "cleavage" eminent?

According to Rossi, community differences can be classified as socio-economic, ethnic, racial, religious, life-cycle related, and time-of-arrival into community related.[35] The differences can be accentuated by various types of group interaction. For example, "social distance" can be modified by the extent to which individuals admit various ethnic groups into varying degrees of intimacy (through such avenues as marriage and community assimilation).

Another important aspect of community difference involves the strength of agreement or disagreement on various community issues (with commitment to norms as a strong influence on that agreement), and the possible polarization that may occur as a result of strong disagreement and high commitment to issues.

Objective Indicators. Perhaps the most sensible way to approach measurement of the social stability factor in this research is some combination of data into a social disorder incidence rate (inclusion in the measure could be based on such disorders as community riots, reported group confrontations per year, number of strikes per year, etc. Each of those conflicts could be weighted as to its severity relative to other social conflicts measured and an aggregate statistic arrived at). The measure would admittedly be a crude one in the beginning, but increased knowledge of social interaction based on the rationale behind the measure could lead to the measure's ultimate improvement.

VI.B.2.5 Physical Security

Concern with physical security (or public safety) most often centers around occurrence of violent crimes. Violent crimes are defined in official statistics as murder, forcible rape, aggravated assaults, and robbery. Also connected with violent crime are crimes against property.

A sophisticated delineation of physical security has been urged by Reiss. In an article entitled "Monitoring the Quality of Criminal Justice Systems", he states:

> To measure the quality of life in a community or society is no simple matter since what is at stake are human values, human judgements, and subjective perception of social reality. Moreover, indicators of the quality of systems may refer to rather distinct levels of the system. First, there is the quality of the institutional order . . . . Second, there is the quality of any organized service, for example the qualitative response of the police to citizen calls for service. Third, there is the quality of the behavior of [public] servants within any system, for example, whether judges dispense justice. And finally, there is the quality of the behavior or responses to those who are served. The level of violence or of hostility to policing in a population is an illustration.[36]

Objective Indicators. Basic data on violent crime include the type of crime (as defined above), and number (in thousands) of crimes actually committed, rate per 100,000 populations, and crimes reported to police.[37]

Although such data as these give us a good estimate of the pervasiveness of different serious crimes, they are subject to reporting deficiencies of differing magnitudes in different communities (especially in suburbs and among white collar workers). This tends to make the available measures suspect when attempting to compare metropolitan areas or communities within those areas.

VI.B.2.6 Culture

For many people, the arts constitute a fundamental contribution to the quality of life, as evidenced by increased attendance at museums, audience size at live performances, sales of classical and modern music recordings, and expanded study of the arts. Art cannot be defined uniquely. Perhaps the highest level of concern with the arts is expressed at the institutional level called the "fine arts", including the performing arts, writing, poetry, painting, sculpture, and music. There are no fine lines between fine arts and applied or popular arts.

Objective Indicators. Alvin Toffler[38] believes that a measurement of the high level of quality of culture should exhibit a high expenditure of both money and time, especially time. Such a high level of expenditure would suggest a high level of commitment to culture.

Perhaps the only reasonable measure available today is one of the amount of human effort directed toward the arts. These data are available in the form:

- Number of Artists by Field (number for the occupational group reported by the Census of Population).[39]

Categories include actors, artists or art teachers, authors, dancer or dancing teacher, musician or music teacher, and other artist types.

Expansion of the number of artists somewhat represents the judgment as to the capacity to promote the arts. In addition to supporting the artists, the art forms must be promoted by institutions and media, such as building and renovating museums and concert halls, and presentation of artistic products in lectures, reproductions, and gallery showings.

VI.B.2.7 Recreation

As defined by this research, recreation encompasses those physical activities other than participation in "the arts", work activities, or passive expenditure of time on such activities as sleep, rumination, and spiritual renewal.

Most commonly mentioned as physical activities in any measure of recreation are bicycling, horseback riding, playing outdoor games or sports, fishing, canoeing, sailing, other boating, swimming, water skiing, camping, mountain climbing, hiking, walking for pleasure, bird watching, wildlife and bird photography, and nature walks. These are forms of outdoor activities. Indoor activities such as bowling, various indoor forms of essentially outdoor sports such as pool, billiards, or ping pong, and other recreational forms should also be included in any such definition.

Objective Indicators. There are certain considerations that should be taken into account in any valid measure of recreation. These include:

1. The number of persons having access to varieties of recreational facilities.
2. The number of persons actually using these facilities, and
3. The number of different groups of persons having access to and using the facilities.

VI.B.3 Political Sector

VI.B.3.1 Introduction

Governmental structures are established in the United States in both formal and informal arrangements for the resolution of conflict and distribution of resources. The political system, of which these structures are a part, is attuned to the discovery of the presence and relative importance of various societal issues. Such discovery, according to Helmer, is a clue to the degree of dissatisfaction felt by Americans with the present conditions in their country.[40] The dissatisfaction, in turn, is the guiding force behind aspirations for societal improvement.

The Quality of Life group has, as one of its major objectives, attempted to discover methods of determining levels of satisfaction with existing societal conditions. In this sense one plays the role of societal evaluator, a responsibility incumbent upon politicians and government administrators.

An examination of political systems based on interpretation of people's quality of life as related to those systems must take into account these five significant factors:

1. Electoral participation
2. Non-Electoral participation
3. Government responsiveness to the public
4. Civil liberties protection
5. An informed constituency.

VI.B.3.2 Electoral Participation

It is assumed that, except under certain conditions, every American adult has the right to vote for the political candidates of his choice. Scammon mentions many of the qualifying conditions under which a person residing in the United States cannot vote.[41] Among those conditions are: (a) citizenship requirements (approximately three million alien adults living in America are not allowed to vote); (b) registration laws; (c) residence requirements for registration; (d) early closing of registration books; (e) literacy test requirements; (f) civil disabilities (e.g. criminal records); and (g) the difficulty of absentee balloting. As restrictive as these voting requirements are, the fact remains that a great majority of Americans are able to exercise that understood right of citizenship--the vote.

A combination of both legal and extralegal exclusion of some people from the voting process, and potential voter apathy under certain circumstances would appear to be the logical rationale behind any measurement of electoral participation.

Objective Indicators. In order to get a fine breakdown of the relative access of various ethnic, age cohort, and socio-economic groups to the electoral process, disaggregation should be performed on the community level, using off-year local elections as a basis for comparative evaluation between communities with similar demographic characteristics.

In order to rate a community as to the level of its electoral participation, it would be helpful to compare mean percent of registrants voting in cities of similar ethnic, age cohort, socio-economic status, and mobility configurations. Alford and Lee have done this to a limited extent by using the percent of registrants voting by Social Structure and Political Structure as the basis for evaluating voting behavior.[42]

VI.B.3.3 Non-Electoral Participation

Not all people feel that the only say they have in government operations rests with their prerogative to vote in local, state, and national elections. Many people are concerned with specific problems that affect them personally and may only crop up between elections, due in many cases to policies carried out by those officials they elected. Gulick et al. examined residents in one community and discovered that although knowledge of certain problems occurring from time to time was general, individual citizen action concerning these problems was not extensive.[43] Gulick defined action as doing any of the following things about one's concern over probelms: (a) speaking directly to a public official; (b) writing a letter to a public official; (c) signing a petition addressed to a public official; (d) writing a letter to a newspaper; or (e) talking to a friend. By doing any of these various things, a constituent could make his views known to those people with authority to act on his recommendations.

Objective Indicators. Bloomberg and Rosenstock devised a political participation "action score" for questionnaire respondents. The action score was based on the number of the following kinds of participation each respondent claimed for himself:

1. Registering complaints about the community or commercial services, politics or civil rights.
2. Requesting assistance from an alderman.
3. Attending meetings or public hearings.
4. Belonging to a neighborhood committee, civic group, or improvement association.
5. Voting in local elections.[44]

The "action score" concept, incorporating items 1 through 4, can be used for a non-electoral participation measure to compare cities, neighborhoods, ethnic groups, age cohorts, and a variety of other sub-populations, making the indicator very versatile.

VI.B.3.4 Government Responsiveness to the Public

The outputs of political systems--public policies and programs--are of central concern here because those outputs are the criteria against which political efficacy, or government responsiveness to its constituents' desires, can be measured. If we consider society as a system and administrators as system managers, it is reasonable to assert that, aside from the officials' responsibility to regulate society's resources and deliver such services as will ensure the optimized utilization of those resources, administrators have a political accountability for achieving goals. These goals must be achieved under budgetary constraint, through proper assessment of current conditions and future projections.

Mosotti and Bowen found that there is a certain degree of variation in city expenditure patterns along functional lines which are associated with variations in three underlying factors--socio-economic status, age, and mobility.[45] Their study emphasized previous findings that budgetary policy does not operate in a vacuum, and that budget allocations represented certain kinds of values, made in response to the characteristics of the community involved. The study did not attempt to discern the "goodness" of the budgetary allotments, but rather to determine if there was a conscious attempt, indicated by the variation of expenditure patterns, to project a public policy based on a set of values.

Objective Indicators. A measure of government responsiveness (or political efficacy) suggested by many researchers is the degree to which government activities meet community needs for public services.

Although it is preferable to analyze one city over time, relating budgetary expenditures on certain services to the socio-economic level, age level, and mobility rate of the city's inhabitants, we cannot find evidence of such a comprehensive statistic. This is such an important area of community analysis, however, that it warrants further research.

VI.B.3.5 Civil Liberties Protection

This factor has been called many things by many researchers (e.g. civil liberties, as listed here; civil rights, ethics and virtues, basic freedoms). Most observers have found a great degree of consensus among all segments of the American population on moral values, amounting to an "American ethos". Gendell and Zetterberg have called this ethos "an unusually explicit version of the humane ideals of Western civilization based upon Athenian philosophy, Roman law, and the Judeo-Christian tradition". The ethos stresses the dignity of man and his "inalienable rights of freedom and equality".[46]

The rights of American citizens were written into the Declaration of Independence, the Preamble of the Constitution, and the Bill of Rights. They have been articulated by politicians, jurists, and editorial writers. Statutes, such as the Civil Rights Acts of 1964 and 1968, have been specifically designed to safeguard those rights from usurpation. Yet today there are calls for a greater effort to assure individual civil rights.

Objective Indicators. After extensively screening the literature for measurements of civil liberties protection, it was concluded that no such measure existed.

VI.B.3.6 An Informed Constituency

That the media of mass communication play an increasingly important role in the purveying of information concerning public issues both during election campaigns and the time in-between those campaigns has become an accepted fact. The degree to which the media affect certain public opinion on issues is highly speculative.

In addition to the media of mass communication, communication on an interpersonal level, between people who are accepted as being somewhat more knowledgeable on certain issues and others who are less knowledgeable, plays an important part in the conveyance of information. On an average day, as reported by Katz, more people participate in discussion of an election than hearing a campaign speech or reading a newspaper editorial.[47] Playing a leading role in the dissemination of information in interpersonal relationships is the "opinion leader". An opinion leader is a person whose ideas are influential at certain times and with respect to certain issues by virtue of the fact that he is "empowered" to be influential by other members of his group. Opinion leadership is not static. It varies among individuals based on the issues involved and the position of an individual in a group hierarchy.

The problem of acquainting the populace with public issues ultimately must concern whether or not information is available from various sources, and, if that information is unbiased enough so that individuals could make up their minds on key issues with objectivity. By unbiased, it is meant that all sides of issues are presented to the public through the media of mass communication (the Federal Communications Commission guidelines, usually referred to as the Fairness Doctrine, are based on this concept).

Objective Indicators. No reliable measure could be found of the degree of informedness of a population in the literature reviewed. There are studies which measure the number of media sources used in relation to the level of an individual's political and organizational participation. This information, however, says nothing about the content of the media presentations and does not indicate the number of media sources available to an individual in any given location.

VI.B.4 Health Sector

VI.B.4.1 Introduction

In a widely-quoted report, the World Health Organization defines health as "a state of complete physical, mental, and social well being and not merely the absence of disease and infirmity".[48]

This utopian[49] definition is relevant to our study, since the purpose of including the health sector in the QOL inventory is to permit an attempt at measuring the general health and well being of an individual, or more practically, to determine the general level of health in his community. Within the framework of our study, the problem of social well being is addressed in its broad aspects in other sectors, and thus, will not be considered as a separate factor under health.

In an addition to an attempt at measuring health, this sector also includes such considerations as quality of health care, and mode of delivery of that care. The phenomenon of community health is one such mode which is becoming increasingly important. It appears, however, that the rationale behind community involvement in physical health care is quite different from that of mental health care; thus, "community" will appear as a consideration within the physical and mental health factors, rather than as a separate entity.

It was felt that a composite of the following factors provides a reasonable profile of general health and well being, both in line with the thinking reflected in the literature, and for the purpose of our investigation:

1. Physical health
2. Mental health
3. Nutrition.

VI.B.4.2 Physical Health

The World Health Organization definition of health cited previously, ("a state of complete physical, mental, and social well being and not merely the absence of disease and infirmity"), indicates the ambiguity associated with defining and measuring health. Personal experience will attest to the fact that the lack of a satisfactory definition of health does not detract from its importance as a concept. Palmore and Luikart[50] performed a study which used a multiple regression analysis of eighteen variables, and found that self-rated health was by far the strongest variable related to life satisfaction, and that it alone accounted for two-thirds or more of the explained variance in all groups analyzed.

The state of the art of defining and measuring health is much the same as that of defining and measuring the quality of life. While the need has been recognized for an index of health, literature on the subject reveals no consensus as to the elements that should be measured to indicate this loosely-defined state of physical well being, nor, in most cases, have the proposed measurements actually been made.

Odin W. Anderson and Monroe Lerner discuss the suitability of various indices in, Measuring Health Levels in the United States 1900-1958.[51] They note that historically, the mortality rate has been the most commonly used index of health, but now, even with various refinements, it is not a very satisfactory measure. With the present level of medical technology, mortality rates now indicate only the grossest differences in health levels.[52]

Dubos notes that changing patterns of disease appear to accompany changing patterns of civilization.[53] For example, cases of reported tuberculosis, infestation with worms, and protein deficiency, which were once valuable indicators of health in the United States (during the period of industrialization), no longer occur in meaningful numbers. As overall living standards have changed for the better, the diseases that claim the most lives per year have also changed.

Objective Indicators. In view of the lack of consensus concerning the definition and measurement of positive health, it appears that the most expedient solution to the problem of finding indicators for physical health is to use statistics measuring degree of ill health: morbidity, disability, and health care facility utilization.

VI.B.4.3 Mental Health

The field of mental health, as treated in the literature, includes both mental illness and mental retardation. A widely-quoted HEW definition makes the following distinctions:

> Mental retardation is usually a condition resulting from developmental abnormalities that start prenatally and manifest themselves during the newborn or early childhood period. Mental illness, on the other hand, includes problems of personality and behavioral disorders especially involving the emotions; it usually manifests itself in young and older adults after a period of relatively normal development.[54]

As with physical health, there is evident in the literature a rising dissatisfaction with traditional indices of mental illness, which include suicide rates, alcoholism, etc. Ernest Gruenberg[55] has suggested that mental illness should be measured in terms of social disability; this measure would be applicable to people in hospitals as well as those out of hospitals. He has also proposed that classifications of causes of disability should be re-examined to facilitate distinguishing mental disability from mental causes.

Objective Indicators. The Group for Advancement of Psychiatry[56] clearly illustrates the problems involved in the measurement of mental disorders:

> (1) Social attitudes toward illness change and may affect the number of patients who seek help; (2) available psychiatric resources increase or diminish--contributing to an increase or decrease in the number of reported cases; (3) changes in diagnostic skills, fashions and nomenclature also increase or decrease the total number of reported cases in any specific diagnostic category.

Michael Flax discusses traditional indicators of mental illness in *A Study in Comparative Urban Indicators: Conditions in 18 Large Metropolitan Areas.*[57] He notes that the main failing of suicide rates and narcotics addiction as indices is that they measure only one type of depression. While schemes for measuring mental health such as those suggested by Gruenberg seem to have the same appeal to logic as does the attempt to measure positive physical health, the problem, as regards this project is also the same. There is no consensus among experts in the mental health field, nor is the type of data available that Gruenberg suggested.

VI.B.4.4 Nutrition

For the purpose of this study, nutrition will be limited to a dietary analysis. "Man needs food as a source of energy for performing work and as a source of raw material with which to carry out the processes of procreation and tissue building."[58] The nutritional aspect of health, as such, is not included in the physical or mental factors, although nutrition has implications in both areas.[59]

Objective Indicators. While it is understood that a complete profile of nutrition has three main components: food intake data, a clinical examination, and biochemical tests,[60] it seems that for the purpose of our project, nutrition should be limited to food intake, or dietary considerations. All three aspects are logically included in the Department of Health, Education and Welfare's *Ten State Nutrition Survey,* 1968-1970,[61] (along with demographic and anthropometric data) where the goal is to assess the overall nutritional status of groups. But this approach results in double-accounting among physical and mental health factors. The United Nation's Handbook of Household Surveys[62] avoids such problems by considering in Chapter 4, "Food Consumption and Nutrition", only the food consumed and its nutritional value, and one assumes that the ramifications of food consumption are discussed in the chapter entitled "Health", which includes such topics as illness, injury, health care visits, hospitalization, and impairments.[63] It seems reasonable that the UN's example be followed, in an attempt to measure health as accurately as possible and with the least amount of overlap in the sector. Other indicators which have been used to describe nutritional status, such an dental statistics and incidence of nutrition-related disease, should be included where applicable.

VI.B.5 Physical Environment

VI.B.5.1 Introduction

The environment is a major factor in the Quality of Life.[64] To what extent this aspect should be evaluated depends largely on one's own conception of what constitutes environmental quality. The physical environment includes a set of climatic, earth, and life-related factors (of which man is a part) that act upon communities and organisms.[65]

From a review of the existing literature five predominant factors were evaluated and found to include most (if not all) possible components of environmental life quality. The following are the factors included under the physical environment:

1. Housing
2. Transportation
3. Public Service
4. Aesthetic Quality
5. Material Quality.

VI.B.5.2 Housing

It is well known that people spend more than half their time at home. The home is the locale of the primary social relationship of family life and influences the physical, social, and psychological development of all who live within it. Besides affecting the health and safety of household members, housing may be a source of pride and satisfaction and a way of investing money and accumulating wealth.[66] The living condition within households and how the public views them in terms of the values projected above will constitute the involvement of housing in this sector.

Objective Indicators. There exists no single, comprehensive, national indicator of housing quality. What must be considered though are indicators that would include three important elements of housing: condition of the unit, functioning of facilities, and living space within the unit. This is not to say that the three aspects constitute all housing quality available, but they do allow accurate and efficient data for use in QOL measurement.[67] These aspects would, of course, be in terms of satisfaction and adequacy as the public views them.

Housing indicators should be interpreted with due regard to certain background information concerning climate, culture, the degree of urbanization, and the demographic, economic, and social structure of the population. When effectively used, housing indicators should distinguish areas with poor housing conditions from those with better conditions. As housing conditions improve, differentiation between areas may be expected to diminish (as will the significance of the indicators). However, since the measurement of housing conditions is of less importance in, or among, areas where housing provisions have become more adequate, this is not considered to be an undesirable feature of the indicators. It would be wise if the indicators were applied separately to rural and urban areas because, as a rule, inadequate housing, overcrowding, and lack of facilities are more common in heavily populated urban areas than in rural areas.[68] There are exceptions, of course, which deserve special consideration. Among these are areas such as Appalachia, many Indian reservations, and various black and chicano communities.

VI.B.5.3 Transportation

We can also speak of transportation as part of one's physical environment. It is very probable that most of the working population uses some sort of transportation, thus making this factor almost a necessity in the quality of life. It is also of grave importance to the public since in terms of leisure it makes the difference between access to outdoor recreation areas and confinement to the limited parklands of many inner city areas.[69] For QOL purposes, transportation should deal with the degree of satisfaction that it provides users as well as dissatisfaction of those who are affected by it as non-users.

Objective Indicators. If the quality of America's cities is to be commensurate with the nation's wealth, construction will be required on an unprecedented scale to provide many facilities for the public. Transport arteries, terminals, and services will then be necessary to provide access to these developments and to furnish residents with the mobility that makes it possible to take advantage of the city and what lies beyond it. This is the obvious function of the transport system: to provide the means of accomplishing the many goals of daily living through ease of moving.[70]

In the urban future the use of transportation is an investment to help design and redesign a city. The very large outlays to be made available for transport modernization can be an integral part of slum clearance, housing, recreation, and renewal programs. In addition, urban designs that are transport minimizing can resolve many of the most vexatious transport problems through built-in transport solutions. It seems that since transport absorbs and affects such a large proportion of the land in urban use, any serious effort to improve the urban environment will depend to a major degree on a broad community approach to providing transport.[71]

Accessibility, including relative accessibility to amenity resources, is a basic consideration in many aspects of the environment. Indicators of transportation quality should cover such items as availability of mass transit, expedient travel routes and the conditions surrounding movement in general, including considerations of trip-time, congestion, safety, and stress.[72]

VI.B.5.4 Public Services

The business of supplying some commodity like electricity or gas, garbage collection, street cleaning, water, sewerage and solid wast disposal, etc, can be defined as a public service. Clearly, the role of supplying the public with various conveniences and services is quite large and therefore is of considerable importance to an individual's well being. For example, Sand Diego County sponsored a study entitled "Environmental Quality Index: A Feasibility Study" which also considered delivery of public service.[73] The extent to which an individual is affected by any of these services depends largely in what area he resides. It is important, therefore, that when weighing public opinion, due considerations should be given to location of dwelling.

Objective Indicators. This particular factor of the physical environment has not been investigated thoroughly in terms of public concern although a few indicators have been used by Harvey Perloff[74] and Michael J. Flax[75] in their quality of life studies.

VI.B.5.5 Material Quality

When an individual buys an item on the consumer market or contracts private services, it is generally accepted that he is getting the best for his money. The fact that a person is dissatisfied with consumer products or services or perhaps his expectations were not founded, in reality indicates a distinct low material quality. In this sense it is the quality of those goods or services that an individual obtains through the consumer market that constitues the material quality factor.

Material quality evolved from a study on the Quality of the Urban Environment by Harvey S. Perloff which includes public investment decision.[76] It is of relative psychological importance that an individual be satisfied with what he buys on the open market. Frequent dissatisfaction has resulted in the rapid growth of the consumer movement in this country, and with it the class action suit as a mechanism for the redress of grievances.

Objective Indicators. When the consumer is subjected to unfair practices by a producer selling poor goods, it is likely that that individual will buy less of that item or none at all. The quality of material goods that one obtains should be of the value that one pays for them. If such goods or private services do not meet personal standards or comply with consumer regulations, the product, of necessity, must either be improved or forced off the market.

Although no indicators were found in existing literature for this factor, it seems of importance to consider and perhaps construct reasonable measures to evaluate public concern. For example, major appliances might be compared in terms of product life, frequency of repair, cost of maintenance, and the safety hazards associated with using the product. Other indicators are suggested in Table 2.

VI.B.5.6 Aesthetic Quality

According to the County of San Diego Regional Issues, "aesthetic pollution is the sum of man's visible impact on the natural environment, measured by the incidence of objects that disturb the natural landscape and ought not to be seen by the general public".[77] Yet there is a positive side that is virtually unexplored--that being, there are beautiful things in a city; architecture, landscaping, clean streets and parcels can all contribute to the aesthetic appeal of a city.

The aesthetic quality of one's general environment is a function of perception, both individual and shared. Aesthetic quality, by its very nature, has a strong affective component--in short, things are outwardly pleasant or unpleasant. For example, a wilderness area, a waterfall, or even a graceful suspension bridge may be pleasing to the eye. Conversely, litter, grafitti, defaced property, bill boards, automobile graveyards, and powerlines, may be regarded as unpleasant by many (but not necessarily all) people. Ugliness, like beauty, is in the eye of the beholder.

The importance of environmental surroundings was demonstrated by Thomas Lindvall and Edward Radford.[78] In a public opinion survey it was shown that a significant level of annoyance developed because of unsightly environmental surroundings.

Objective Indicators. In compiling workable, reliable, and quite reasonable indicators, the general concept of what constituted an insult to the environment was considered. Table 2 presents indicators found to be most generally included in various aesthetic studies on quality of life.

VI.B.6 Natural Environment

VI.B.6.1 Introduction

We have seen that the natural environment has been the focal point of present day public dissatisfaction. It is without doubt that the quality of the components of the natural environment involves each and every one of us that live on this earth.

Previous research indicates that the natural environment is a prime ingredient in quality of life. It has been variously defined as the complex of climatic, edaphic and biotic factors that act upon an organism or an ecological community and ultimately determines its form and survival.[79] The following factors are offered as constituent parts of natural environmental quality:

1. Air quality
2. Water quality
3. Radiation
4. Toxic substances
5. Solid waste
6. Noise.

In considering all of these factors as being part of one's quality of life the problem arises as to what indicator would best give results in terms of natural environmental quality. According to the National Planning Association, the problem of indicators must be put in terms of the number of people affected by pollutants.[80] They maintain that although the amount of physical substances is important, what is most significant is the manner in which these pollutants affect the population. Since there is a controversy as to which indicator would give better data, the following discussion of each factor will include all types of objective measures which could constitute a reliable, comprehensive, and quite inclusive indicator.

VI.B.6.2 Air

As President Nixon indicated in his 1971 environmental message,

> the problem of air pollution results not so much from choices made, as from choices neglected. In our efforts to achieve the most spectacular progress the world has ever known, we failed to notice the

> hazards of airborne contaminants. As we strove to achieve new goals in improvement, we failed to consider the consequences of dumping aerial filth. Air pollution has become an unwanted by-product of our successful pursuit of higher standards of living.[81]

Air pollution as a cause of annoyance from domestic and industrial sources and from motor vehicles may be subdivided into odors, particulates, and irritants. The size of the problem is indicated by several investigations.[82]

Objective Indicators. Significant indicators collected for air quality show not only physical characteristics but also the effect on the public. Refer to Table 2 for a comprehensive list of air quality indicators.

VI.B.6.3 Water

One of the major factors under the natural environment is that of water pollution. Robert V. Ayres and Allen V. Kneese in their article "Pollution and Environmental Quality" indicate that among the various major categories of pollution, water pollution has been the most damaging.[83] Joseph L. Fisher in his article complements this fact by saying that

> water is a deceptive commodity; it appears to be more or less the same everywhere, but actually it varies over wide ranges with respect to many characteristics. What is suitable water for certain industrial purposes such as cooling would be quite unacceptable as drinking water. And acceptable drinking water may contain far too many impurities to be used as process water in certain industrial operations in which exceedingly high quality water is absolutely necessary.[84]

It seems that in this kind of situation one can hardly expect to find uniform and simple indicators of condition.

Objective Indicators. Some objective measurements of certain physical characteristics have been developed. We can talk of these qualities as indicators of, for example, water pollution. Such things as biochemical oxygen demand (BOD) which measures the pollution in the water by the amount of dissolved oxygen required to decompose it; the coliform count, which is a generalized measure of bacterial content of the water; turbidity, which expresses the amount of suspended soil and other sediments in the water; inorganic mineral content; and temperature[85] are commonly used measurements. Other parameters can also be included here, such as total dissolved solids, salinity, pH, phenyls, nutrients, and flow or discharge rates; number and percent of persons living in proximity to polluted boides of water, bodies of water or miles of stream meeting specific criteria.[86]

Interrelations among the quality characteristics and uses are numerous, complex, subtle, and frequently not well understood. Therefore it is important that careful and knowledgeable use of most of the indicators be employed. At this point we are not qualified to select the water pollution indicators that would be most relative to a given quality of life for this factor. We assume though that since water pollution is so damaging to the public, full consideration should be given to all of the indicators noted.

VI.B.6.4 Radiation

Radiation, both ionizing and non-ionizing, is increasingly present in the environment. Exposures to man-made radiation emissions from X-ray equipment, nuclear power plants, reactor fuel reprocessing plants, and electronic products such as color television receivers, microwave ovens, lasers, etc. have only increased the public concern about radiological hazards.

Exposure of man to radiation can cause biological injury, including genetic effects and cancer. It is generally agreed that any increase in radiation exposure will be accompanied by a commensurate increase in the risk of injury. Therefore, society has a responsibility to keep radiation exposures as low as possible.[87]

Objective Indicators. Although radiation is such a concern to the public, not enough data has been collected for a reliable objective measurement. It would seem, though, that such an issue as radiation protection could be measured in terms of percent of radioactivity of such things as water, soil, people, and any other item that could harbor radiation. These could be compared with lethal doses for perspective items and evaluated in terms of danger doses. It is quite obvious that much work is needed in this area to properly develop a reasonable objective measure of radiation.

VI.B.6.5 Toxic Substances

The use of toxic substances has within recent years stirred intense controversy. The major concerns fall into three categories: acute toxicity to humans, chronic toxicity to humans, and adverse effects on the natural environment.[88]

Overall monitoring of particular toxic substances in the environment requires knowledge of all sources of exposure. Such data have not yet been collected in a systematic fashion.

However, steps are underway to build an integrated framework for such monitoring. Various agencies, departments and organizations like the Council on Environmental Quality[89] the U. S. Department of Health, Education and Welfare,[90] Resources for the Future,[91] the Urban Institute, and others have been investigating the impact of toxic substances on the natural environment and its effects on the population.

VI.B.6.6 Solid Waste

The handling and disposing of refuse, trash and other solid waste (e.g. waste from municipal and industrial sources) are included in this sector. The measurement of this factor should include such things as magnitude of the disposal problem and a measure of the efficacy of recycling programs, plus an indication of hazards associated with waste disposal.

VI.B.6.7 Noise

Even though noise has been of major concern to occupational physicians for many years, it is only during the last few years that it has been regarded as an important public health problem. One reason for the lack of attention is the difficulty of demonstrating effects other than those associated with damage to the ear and loss of hearing. On the other hand, it is apparent to many that noise can create severe annoyance. Some of the principal sources of ambient noise pollution are aircraft, including supersonic booms, other modes of transportation, building construction, industrial or commercial operations, as well as household appliances and air conditioners.[92]

It is interesting to note that the U. S. EPA Noise Abatement and Control Office is currently working on a Community Noise Reference Scale that should assist in establishing norms and monitoring techniques for noise pollution.

FOOTNOTES AND REFERENCES

1. Definitions of "index," "parameter," and "indicator" follow those of The Mitre Corporation, Water Quality Indices, April 1972.

2. Some of the authors explicitly stated that their lists were sets of factors influencing the quality of life or the quality of the environment. Others composed their lists for other reasons, but their tabulations were felt to be relevant to this study.

3. Norman C. Dalkey and Daniel L. Rourke, Experimental Assessment of Delphi Procedures with Group Value Judgements (RAND R-612-ARPA, 1971), p. 28.

4. Michael J. Flax, A Study in Comparative Urban Indicators: Conditions in 18 Large Metropolitan Areas (Washington, D.C.: Urban Institute, 1970), p. 9.

5. San Diego Environmental Development Agency, Environmental Quality Index--A Feasibility Study (San Diego County, San Diego: 1972).

6. Ibid., p. 16.

7. Community and Environmental Assessment Committee, "Sector Variables Developed at February 22, 1972 Meeting in Raleigh" (mimeo, 1972).

8. John Oliver Wilson, "The Concept of Social Indicators," in Booz-Allen Hamilton Associates, op. cit., p. 3.

9. White House Conference on Youth and Individualism, "Quality of Life Needs More Emphasis: An Extract from the Report of the . . ." in Booz-Allen Hamilton Associates, ed., The Quality of Life Concept: A Tool for Decision-Makers (Washington, D.C.: mimeo, 1972).

10. Milton Moss, "Consumption: A Report on Contemporary Issues" in Sheldon, Eleanor Bernert and Wilbert E. Moore, Indicators of Social Change (New York, Russell Sage Foundation: 1968), pp. 504-505.

11. Bertram M. Gross and Michael Springer, "A New Orientation in American Government," Annals of American Academy of Political and Social Science, Vol. 371, pp. 4-5.

12. Office of Management and the Budget, Social Indicators Washington, D.C.: Draft #7, mimeo, 1972)

13. Harvey S. Perloff, ed., The Quality of the Urban Environment: Essays on "New Resources" in an Urban Age (Washington, Resources for the Future: 1970), pp. 22-23.

14. Terleckyj's list of 18 "social goal categories" may be superior to Perloff's, but came to our attention too late to be considered in this manuscript. See Nestor E. Terleckyj, "National Goals Accounting: A Framework for Evaluating Opportunities for the Achievement of National Goals" (Washington, D.C., National Planning Assoc., mimeo 1972).

15. Ms. Pamela Cooper, a researcher for the Environmental Protection Agency with special experience with the problems of blacks and the center city, aided at this point.

16. National income accounts, no matter how well they account for social costs, quality change, leisure, etc., will never be a measure of well-being, if only because they value goods and services at the margin, while an index of well-being would value goods by the consumer surplus area under their demand curves. Furthermore, there are numerous goods which are likely never to be valued in terms of dollars. For these reasons, it seems appropriate to consider income only one QOL factor, and not a substitute for a QOL index.

17. Available from Survey of Current Business (U.S. Department of Commerce, Washington: 1972).

18. George J. Stigler, The Theory of Price (third edition), (New York, Macmillan: 1972), pp. 293-4.

19. A very similar alternative index is the Gini index, defined below:

$$G = \frac{\int_0^{100} (x - f(x))dx}{10,000}$$

where G is the Gini index of inequality, and f(x) is the Lorenz curve. Source: Bruce M. Russett, et. al., World Handbook of Political and Social Indicators (New Haven, Yale: 1967), p. 238.

20. Series P-60 (U.S. Commerce Department, Bureau of the Census, Washington: 1972).

21. Statistical Abstract of the United States (U.S. Department of Commerce, Washington, D.C.: 1971), pp. 271-298.

22. Welfare in Review (U.S. Department of Health, Education and Welfare, Washington, D.C.: 1972).

23. Internal Revenue Service, Treasury Department, Statistics of Income, 1962; Supplemental Report, Personal Wealth.

24. Robert L. Kahn, "The Meaning of Work: Interpretation and Proposals for Measurement" in William Campbell and Philip E. Converse, The Human Meaning of Social Change (New York, Russell Sage Foundation: 1972), p. 18.

25. Accident rates can be classified either as injury-frequency measures (counting the number of disabling work injuries per one million employee-hours), or as severity measures (counting average days out of work per disability case). Both are available from: Bureau of Labor Statistics, Annual Report, Injury Rates by Industry (U.S. Department of Labor, Washington, D.C.: 1971).

26. Reported in Employment and Earnings.

27. Marvin B. Sussman, "Family, Kinship and Bureaucracy," in The Human Meaning of Social Change, ed. by Campbell and Converse (New York: Russell Sage Foundation, 1972), pp. 127-158.

28. Ibid., p. 155.

29. Ibid., pp. 157-58.

30. Alvin Toffler, Future Shock (New York: Random House, Inc., 1970), passim.

31. Paul C. Glick, "The Life Cycle of the Family," in Sourcebook in Marriage and Family, ed. by Marvin B. Sussman (Boston: Houghton and Mifflin Co., 1963), passim.

32. Hadley Cantril, The Pattern of Human Concerns (New Brunswick, N.J.: Rutgers University Press, 1965).

33. Peter A. Rossi, "Community Social Indicators," in The Human Meaning of Social Change, ed. by Campbell and Converse (New York: Russell Sage Foundation, 1972), pp. 87-126.

34. L. Berkowitz, and K. Lutterman, "The Traditionally Socially Responsible Personality," Public Opinion Quarterly, 32 (1968), 169-85.

35. Rossi, "Community Social Indicators," passim.

36. Albert J. Reiss, Jr., "Monitoring the Quality of Criminal Justice Systems," in The Human Meaning of Social Change, ed. by Campbell and Converse (New York: Russell Sage Foundation, 1972), p. 392.

37. U.S., Department of Justice, Federal Bureau of Investigation, *Uniform Crime Report of the United States*, 1971.

38. Alvin Toffler, "The Art of Measuring the Arts," *Annals of the American Academy of Political and Social Science*, 373 (September 1967), pp. 141-155.

39. U.S. Department of Commerce, Bureau of the Census, *U.S. Census of Population: 1960, Subject Reports, Occupational Characteristics, Final Report PC(2)-7A* (Washington, D.C.: U.S. Government Printing Office, 1963).

40. Olaf Helmer, *On the Future State of the Union* (Menlo Park, Calif.: Institute for the Future, 1972), p. 9.

41. Richard M. Scammon, "Electoral Participation," *The Annals of the American Academy of Political and Social Science*, 371 (May 1967), pp. 59-71.

42. Robert R. Alford and Eugene C. Lee, "Voting Turnout in American Cities," *The American Political Science Review*, 62 (September 1968), pp. 796-813.

43. John Gulick, *et. al.*, "Newcomer Enculturation in the City: Attitudes and Participation," in *Urban Growth Dynamics*, ed. by Chapin and Weiss (New York: John Wiley and Sons, Inc., 1962), p. 346 *et. passim*.

44. Warren Bloomberg, Jr., and Florence W. Rosenstock, "Who Can Activate the Poor: One Assessment of Maximum Feasible Participation," in Bloomberg and Schmandt, *Power, Poverty, and Urban Policy, Vol. II* (Urban Affairs Annual Reviews, 1968), pp. 313-330.

45. Louis H. Massoti and Don R. Bowen, "Communities and Budgets: The Sociology of Municipal Expenditures," *Urban Affairs Quarterly*, 1 (September, 1965), pp. 39-58.

46. Murray Gendell and Hans L. Zetterberg, eds., *A Sociological Almanac for the United States, 2nd ed.* (Totowa, New Jersey: The Beaminster Press, 1963), pp. 25-27.

47. Elihu Katz, "The Two-Step Flow of Communication," in *Mass Communications, 2nd ed.*, ed. by Wilbur Schramm (Urbana Ill.: University of Illinois Press, 1960), pp. 348-49.

48. World Health Organization, "Constitution of the World Health Organization, Annex I in *The First Ten Years of the World Health Organization*, WHO, Geneva, 1958, fn. 32 in Sheldon and Moore, *Indicators of Social Change* (New York, Russell Sage Foundation: 1968), p. 585.

49. Rene Dubos, Man, Medicine and Environment (Washington, Frederick A. Praeger, Publishers: 1968) p. 67.

50. Erdman Palmore and Clark Luikart, "Health and Social Factors Related to Life Satisfaction," Journal of Health and Social Behavior, Vol. 13, no. 1, March, 1972 (pp. 69-78).

51. Odin W. Anderson and Monroe Lerner, Measuring Health Levels in the United States 1900-1958, Health Information Foundation Research Series 11, 1960, p. 3.

52. Anderson and Lerner, Measuring Health Levels, p. 6.

53. Dubos, Man, Medicine and Environment, p. 67.

54. Wilbur J. Cohen and Arthur J. Lesser and Wallace Babington, "New Approaches to Mental Retardation and Mental Illness," Indicators, U.S. Dept. of HEW, 1963, p. xvii, in Selma J. Mushkin, Health and Hospital Expenditures of State and Local Governments: 1970 Projections, The Council of State Governments, Research Memorandum #390, 1966, p. 18.

55. Ernest M. Gruenberg, "On Measuring Mental Morbidity," Ch. 10 in S. B. Sells, ed., The Definition and Measurement of Mental Illness, PHS pub. #1873, p. 227.

56. Group for Advancement of Psychiatry in Indicators of Social Change by Sheldon and Moore, eds., p. 584. "Problems of Estimating Changes in Frequency of Mental Disorders," Report No. 50 (New York: August 1961), pp. 469-517.

57. Michael J. Flax, A Study in Comparative Urban Indicators: Conditions in 18 Large Metropolitan Areas, The Urban Institute, 1970, p. 74.

58. Stanley Segall, "Food," in Environmental Health, P. Walton Purdom, ed. (New York, Academic Press: 1971) p. 77.

59. White House Conference on Food, Nutrition and Health, final report, 1969, p. 45.

60. Interview with Donald I. Miller and J. W. Boehne, August 1, 1972, Nutrition and Food Composition Section, Division of Nutrition, FDA.

61. The Ten State Nutrition Survey 1968-1970, DHEW pub. no. (HSM) 72-8130-4, 5 vols.

62. Handbook of Household Surveys: A Practical Guide for Inquiries on Levels of Living, Statistical Office of the United Nations, Department of Economic and Social Affairs, Studies in Methods Series F #10, United Nations, N.Y.

63. *Ibid.*, pp. 35-58.

64. Council on Environmental Quality, *Environmental Quality*, (Washington, D.C.: 1971), p. 3.

65. Environmental Development Agency, *Environment Quality Index--A Feasibility Study*. County of *San Diego Regional Issues, Vol. 1* prepared by Donald Macdonald and Donald G. Malcolm (California: 1972) p. 16.

66. Office of Management and Budget Statistical Policy Division, *Social Indicators* (May 1972, Draft #7) p. 2 (mimeographed).

67. Office of Management and Budget Statistical Policy Division, *Social Indicators* (May 1972, Draft #7), p. 3 (mimeographed).

68. Office of Management and Budget, Statistical Policy Division, *Social Indicators* (May 1972, Draft #7) pp. 1-2 (mimeographed).

69. Council on Environmental Quality, *Environmental Quality* (Washington, D.C.: 1971) p. 202.

70. The Urban Institute. *A Study in Comparative Urban Indicators* ed. by Michael J. Flax (Washington, D.C.) p. 39.

71. *Ibid.*, pp. 100-101.

72. Council on Environmental Quality. *Environmental Quality* (Washington, D.C.: 1971) pp. 41-47.

73. Environmental Development Agency. *Environment Quality Index: A Feasibility Study* County of San Diego Regional *Issues, Vol. 1* prepared by Donald Macdonald and Donald G. Malcolm (California, 1972) p. 84.

74. Resources for the Future. *The Quality of the Urban Environment* ed. by Harvey S. Perloff (Maryland, Johns Hopkins Press: 1969) p. 22.

75. The Urban Institute. *A Study in Comparative Urban Indicators* ed. by Michael J. Flax (Washington, D.C.) p. 40.

76. Resources for the Future. *The Quality of the Urban Environment* ed. by Harvey S. Perloff (Maryland, Johns Hopkins Press: 1969) p. 226, p. 67.

77. Environmental Development Agency. *Environment Quality Index--A Feasibility Study*. County of San Diego Regional *Issues, Vol. 1*, prepared by Donald A. Macdonald and Donald G. Malcolm (California: 1972) p. 84.

78. The Fourth Karolinska Institute Symposium on Environmental Health. *Measurement of Annoyance Due to Exposure to Environmental Factors*, ed. by Thomas Lindvall and Edward Radford (Stockholm: 1971) pp. 1-10.

79. Council on Environmental Quality. *Environmental Quality* (Washington, D.C.: 1971) p. 8.

80. National Planning Association, *Social Indicators* (Washington, D.C.: 1971) p. 8 (mimeographed).

81. Council on Environmental Quality. *Environmental Quality* (Washington, D.C.: 1971) pp. 8-10.

82. The Fourth Karolinska Institute Symposium on Environmental Health. *Measurement of Annoyance Due to Exposure to Environmental Factors*, ed. by Thomas Lindvall and Edward Radford (Stockholm: 1971) p. 10.

83. Robert V. Ayres and Allen V. Kneese, "Pollution and Environmental Quality," *The Annals* (May 1967, Vol. 371) p. 240.

84. Joseph L. Fisher, "The Natural Environment," *The Annals* (May 1967, Vol. 371) pp. 127-140.

85. Environmental Development Agency. *Environmental Quality Index--A Feasibility Study*. County of San Diego Regional Issues, Vol. 1, prepared by Donald A. Macdonald and Donald G. Malcolm (California: 1972), p. 41.

86. Office of Management and Budget Statistical Policy Division, *Social Indicators* (May 1972, Draft #7) p. 2, part E (mimeographed).

87. Council on Environmental Quality. *Environmental Quality* (Washington, D.C.: 1971) p. 16.

88. Environmental Development Agency. *Environmental Quality Index--A Feasibility Study*. County of San Diego Regional Issues, Vol. 1, prepared by Donald A. Macdonald and Donald G. Malcolm (California: 1972) p. 36.

89. Council on Environmental Quality. *Environmental Quality* (Washington, D.C.: 1971) p. 226.

90. U.S. Department of Health, Education, and Welfare, *Environmental Health Problems* (Maryland: 1970) p. 20.

91. Resources for the Future. *The Quality of the Urban Environment*, ed. by Harvey S. Perloff (Maryland, Johns Hopkins Press, 1969) pp. 3-26.

92. The Fourth Karolinska Institute Symposium on Environmental Health. Measurement of Annoyance Due to Exposure to Environmental Factors, ed. by Thomas Lindvall and Edward Radford (Stockholm: 1971) p. 10.

SECTION VII
ANALYTICAL DIMENSIONS

While it is clear that the QOL is composed of many facets, it is not as apparent that there are similarly many characterizations of the QOL which vary from person to person, group to group, and area to area. Setting up an indexing formula to measure the QOL is a simple task only if there is consistency in the reality disclosed, assuming the measures themselves are good. It is assumed that the measures will not be initially reliable and that the reality measured will not be well defined in the mind of the public. The questions addressed in this chapter are, (a) to what extent can generalizations be made about people's QOL; (b) to the extent that these generalizations are limited, what are the limiting factors; and (c) how do they influence the QOL index (QOLI). It is through this particularized understanding rather than through a generalized statistic that progress can best be made on the policy problems related to improving the QOL.

This Chapter will look at five analytical areas which will lead to answers for the questions raised above: (1) what are the population parameters required to explain variations in the QOL; (2) what questions and answers about the QOL are possible by creating QOL data matrices; (3) what can be learned from time series analysis of these matrices; (4) what causal relationships are involved in determining high or low QOL; and (5) how far can we aggregate or generalize QOL data?

VII.A Parameters Associated with Variation in the QOl

A high QOL for one person may be radically different from a high QOL for another person. Obviously the characterization of the QOL for a Colorado farmer will be radically different from that of a New York cosmopolite. The dimensions which influence the meaning of QOL to different people are themselves likely to vary in strength from person to person. The first problem to be solved is to better understand the identity of these influential dimensions and the circumstances under which they become more or less important to the QOL.

Assume that there are no dimensions related to the QOL other than our measurements of the QOLI for each of the thirty factors (computed from the formula which combines objective and subjective data which can vary on an index scale from 1-10). Then, the following curve would represent the distribution of scores across a selected population of interest to us for only one factor. The curve hypothesized here is quite flat because it has been assumed that, even for a single factor, the distribution of scores will represent a wide variety of tastes, values, and real conditions, i.e. the standard deviation of scores is great. The QOL index scores for the hypothetical factor represented by the above graph is very interesting in that the number of persons near the mean is so small as to be unrepresentative of the condition for the majority of people.

Suppose there is reason to believe, however, that a component dimension of the curve does have something to do with these scores. This dimension has nothing to do with the objective conditions per se but is associated with subjective attitudes or, more accurately, with the characteristics of people who give these attitudes. Let the dimension be the difference between male and female persons and the factor in question be the quality of air. It can be hypothesized that women have a lower quality of life because the dirty air makes it hard to clean clothes which get dirty on the clothes line while men have a high quality of life because smoke in the air means greater industrial activity and easy, high paying jobs on the ground. Imagine a QOL distribution by sex as it might appear if these simplifications were true and unobscured by other things.[1] In Figure we can see that the original distribution is "explained" by keeping separate the two scores. If there were no desirable difference in the QOL factor, by sex, the distributions would be merged into one.

How much of the variance is accounted for by sex of the respondent? How much of the variance is accounted for by family income? How are the parameters which account for the greatest variations in QOLI score identified? Generally, any specific parameter which does not reproduce the same distribution may illuminate significant differences in the QOL. A "good" explanatory parameter would result in a distribution which has a smaller standard deviation around the mean score for the group examined. A "bad" parameter--like left-handedness--would explain little because the distribution of scores for this group is likely to be the same as for the total population (assuming being left-handed does not affect the chances of generating a QOL score any different than the remainder of the population).

Social science research routinely looks at standard demographic variables such as age, sex, income, etc., to establish a basis for isolating patterned variations. Of all the possible characteristics which might influence the QOL, which should we include? Since the QOL factors are derived from areas of interest to many academic disciplines we would have to cover a lot of ground to discuss the relationship between objective conditions and attitudes in each of these areas. We have settled for a brief review of the literature related to environmental perception and attitude to see if, in fact, considerable variations among people occur and along what divisions they have been found to occur. This review indicated the following important variations which are referred to as analytical dimensions: geographic location, education, age, ethnicity, health, sex, political disposition, socioeconomic status, and life adjustment.

VII.A.1 Geographic Location

According to Lynch,[2] impressions of objects become less vivid as distance from home increases. Thus, he mentions, there is ground for considering the immediate area around one's residence as a highly influential factor in accounting for the degree of value perception. Jeanne Sigler in her study on public attitudes of air pollution, confirms Lynch's statement by stating that proximity affects the nature of air pollution phenomenon as experienced by respondents. For example, respondents living closest to the sources of pollution seem to be more likely to think of air pollution as bad odors, dustfall, and eye irritants than those living far from the sources of pollution.[3]

Other studies related to geographic differences in perception showed that, in contrast to other areas, people in the West and Northeast are bothered most by exhaust. Westerners also are more likely to see considerable danger in the effects of insecticides and fertilizers on water supplies than respondents located elsewhere. In contrast, people in the midwest were concerned more about industry and in the south by dust.[4]

Recent surveys have shown that perceptions of outdoor noise levels in central sections of large cities are twice as high as those in the residential area of those cities. In turn, perceptions of noise in residential areas of cities are twice the perceived level than for suburban or small town residential areas. The significance here is that noise level perception increases with population density.[5]

Public censure of different industries varied considerably by regions of the country. As might be predicted each industry comes in for the greatest unfavorable attention in the areas where it operates in greatest volume. For example, steel and automobiles are most disliked in the Midwest; pulp and paper plants are least well liked in the South and in the West. Oil is the number one villain in the West, primarily because of the widely publicized oil slick disasters on the Pacific coast and its contribution to water pollution.[6]

A comparison of air quality data indicated that the geographic distribution of two major pollutants (sulfur dioxide and sulfuration) is also different. It would appear that the two measures of air pollution do in fact measure different things in some cases, but that the people's response is only in part related to this difference. It is also related to the concentration of the ambient air quality findings for these two pollutants.[7]

In a study by Jane Schusky,[8] residents who were asked intentionally vague questions concerning the definition of any life factor, tended to express their ideas in terms of personal experiences regarding conditions of local surroundings. In a related study, Hoch found support for the notion that environmental quality (open space, air pollution, solid waste, sewage treatment, noise levels, wages, time budgets) declines with growth of city size.[9]

That population density also is a significant factor in environmental quality was shown quite clearly in a survey done in St. Louis. Due to the high concentration of traffic and business establishments, plus its high population density, the problems of certain pollutants were quite large, hence eliciting the effects of overcrowdedness. This is to say that perhaps high density areas increases or magnifies the problem of air pollutants over low density areas.[10]

VII.A.2 Education

Crenson found that among individuals living in high smog areas, 75 percent of those with a high school education or more reported they were bothered by air pollution, while only 48 percent of those with less than a high school education reported such annoyances.[11]

In a similar study, Schusky found that respondents with a moderate educational attainment were more likely to express dissatisfaction with all their surroundings than those with little education. The results of both studies suggest that level of education could make a big difference in value perception.[12]

In general, the higher the educational level, the more the citizen is likely to do about pollution. Further, educated people, younger adults, and people living in larger cities are the most concerned about pollution.

VII.A.3 Age

Crenson found that individuals over forty years of age were less likely to be bothered by air pollution than were individuals forty and under who lived in similarly polluted neighborhoods.[13] He concluded that perhaps this indicates a perceptive difference in age. Saarinen also demonstrated a similar relationship between age and perception of drought hazards.[14]

VII.A.4 Ethnicity (Race)

Van Arsdol[15] found that non-whites are less aware of air pollution than whites, even in cases where air pollution is more severe in the non-white residential areas. He attributed his findings, as did Alexander and Sabagh,[16] and Crenson,[17] to non-whites having special social hazards to contend with like poverty, discrimination, and crime, which diverted their attention from environmental problems.

VII.A.5 Health

In Jeanne Sigler's study the results indicated that a majority of people who complain of problems such as nose, throat, and eye irritations or breathing difficulties are more likely to attribute them to pollution.[18]

VII.A.6 Sex

In a recent survey, Smith[19] found that females are bothered more than males by air pollution. This would seem to show that there may be some general differences in perception due to sex difference.

VII.A.7 Political Disposition

According to Tognacci, Democrats tended to express greater concern about ecological issues than did persons who classified themselves as conservative or Republicans. Furthermore, persons holding a more liberal sociopolitical outlook were more concerned about environmental issues than were more conservatively oriented individuals.[20]

Socioeconomic Status (Income Level, Occupational Status)

Crenson found that of those people making $5,000 and over, 76 percent were annoyed by air pollution, compared to only 51 percent of those making less than $5,000.[21] Pollution here appears to be somewhat of an elitist issue, more likely to be perceived as a serious problem by the better educated (who generally have higher incomes) than by the lesser educated (who have lower incomes).

Irving Hoch also gives insight into the difference of perception due to income. He showed that the South had significant disagreements when assessing values to life factors. This may have occurred because of low wage levels for male occupations. A factor here may be low wages for black workers in the South, and high concentration of blacks in those occupations.[22]

In terms of occupation, the most concerned about environmental quality are professionals, proprietors, and managers; the least concerned are the semi-skilled or unskilled. This can be coupled with education since generally the level of education determines one's occupation.

Generally speaking the lower socioeconomic groups seem to be more affected by pollution problems but show less awareness of the problem than members of the higher socioeconomic groups. Research results are inconsistent at this point; however women of low socioeconomic status more frequently expressed concern about pollution than women of high socioeconomic status. In fact, according to Medalia's[23] study of Clarkston, Washington, there is a variation with social class and attitude characteristics across all groups in spite of equal exposure to pollution.

VII.A.3 Life Adjustment

The correspondence of our QOL measure insofar as it is based on a level of satisfaction scale brings it into the arena of "life happiness" research. It is quite likely that the people with the highest QOL will be the most happy but does happiness cause high QOL or vice versa? In their Measures of Social Psychological Attitudes,[24] Robinson and Shaver review the correlates of life satisfaction. Life satisfaction is reported to increase with social status, job satisfaction, income, and education. Life satisfaction is reported as being higher for blacks in part because of a low association of income with satisfaction. Satisfaction for blacks appears to decrease with elevation to middle income status. Unhappiness was shown to increase with age, unemployment, retirement, and with urban density.

VII.B Matrices of Factors and Population Parameters

Using our list of QOL factors as one axis and the analytical dimensions as the other axis, it is possible to generate a series of QOL matrices, e.g., factors by income matrix, factors by age matrix, etc. Each matrix of data would show the relationship between the factors and one of the population parameters. This comparison would help understand variations among people when considering only one characteristic. Collectively, the matrices could be examined for their interaction effects,[25] or for the clusters of highly interrelated factors or parameters.[26] Such techniques can help answer questions about our measurement of the QOL which would not be visible without such dissection. Such questions cannot be answered in the abstract (without data).

Imagine the following hypothetical QOL matrices (see Figure 7.3), five factors by 10 age and income groups. Without even filling in numbers to these matrices of QOL data one can imagine questions which one would want to have answered about the QOL: Does the QOL increase or decrease with age? What discernable differences, if any, is QOL related to income levels? Is there possibly a linear relationship between QOL index and income increment? Does QOL increase with every increment of income for all factors? for all racial groups? for all ages? Is the QOL lower for our Colorado farmer (age 35, income $6,000) than it is for our New York Cosmopolite (age 35, income $60,000)? If the answers come out "no", then explainations are in order. If the answers come out "yes", then it becomes necessary to show which factors are lowest and what can be done about them.

High scores do not necessarily constitute a higher QOL than low scores. There undoubtedly are elements of the population which would score disproportionately high on their factor scores in comparison with their actual conditions. Research focusing on human deprivation[27] and relative deprivation[28] indicates that the abjectly poor are often less inclined to respond with discontent than those who have moved off the bottom rung of society. A rank ordering of high scores would nevertheless be discriminating about the majority of the population. Special considerations will undoubtedly have to be developed for both extreme poverty and wealth as indicated by empirical data when it becomes available.

Such data matrices can also answer important questions about the factors and their measurement validity. What does it mean when one factor is subjectively evaluated the same by all persons regardless of the objective conditions or breakdown by analytical dimension? What does it mean if the scores for a factor are apparently random? What does it mean when one group of people score low on a factor or group of factors (remember, a low score from the formula may mean only an untrustworthy not an unimportant factor). What are the causal relationships which exist between analytical dimensions and factors?

Data matrices can be generated which compare objective scores and subjective scores for all members of the population. A cluster analysis of these correlations would indicate groups of the population which can be characterized by different QOL. Who will they be, the rich, the old, the poor? Is it necessarily a characteristic of high QOL to be in a group or out of a group? The validity of a measure for a QOL factor could be defined as the proportion of the population with a correlation[29] between objective and subjective scores greater than $r = .5$.[30]

VII.C Time Series Analysis

"The 'quality of life' may register more dramatically in the long term through upward adjustments of expectations than by trends in gratifications themselves."[31] The factors which compose the QOL today will vary in emphasis as the social and physical conditions which are instrumental to the definition of those factors vary and become redefined over time. It is possible to become accustomed to conditions which would have been frightening at times when the conditions were infrequently exposed to us. This year may bring three smog watches and next year four (or three watches and one smog warning). The distinctions made in measurement may make it difficult to know the difference in fact. Without information in the form of repeated measurements with the same instruments it becomes difficult to know what has become qualitatively "acceptable" simply because it has become a frequent event.

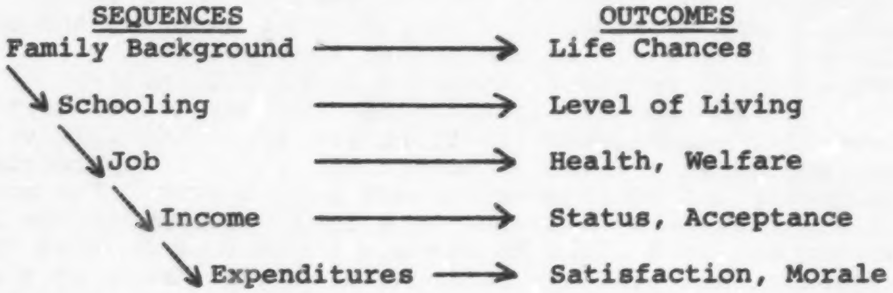
Our ability to improve the QOL depends on our ability to generate programs to influence the QOL. Our ability to know if our programs influence the QOL depends on our ability to detect and measure social change. While a careful discussion of time series analysis is premature there are several points to be made.

If our data are to be used to answer questions about the direction and extent of change in the QOL it must be data which people will still care about 10 years later. Special purpose data collection and one-time studies of the QOL which are narrowly defined are likely to provide inadequate answers for present questions and future questions alike.

Time-series data will help to answer the following questions: How do the factors change over time? Do the factors change the same for all analytical dimensions? What is the nature of their serial causal relationship? How are changes in public perception and factor measurement accuracy reflected in serial data?

VII.D Causality Issues Related to the QOL

Our ability to assess accurately the QOL depends primarily on the quality of our descriptive data and secondarily on the predictability of our causal analysis. The only treatment of causal sequences related to the QOL which came to our attention was Otis D. Duncan's schematic representation of the "Socioeconomic Life Cycle" reproduced below:[32]



Duncan's model is basically a longitudinal conception of how a high or low QOL may emerge over time, an area we have excluded from systematic attention by our rules of scope. It covers the sequence of formative events upon which a person's life is built and constrained. This is to be distinguished from a cross-sectional sequence of causes, i.e., those operating at any point in time. The two overlap in Duncan's diagram, but this simply reflects the poverty of data relating to these matters and the complexity of separating the two.[33]

Once the conditions responsible for variations in the QOL can be identified, weighed, and the extent of their influence determined, as is suggested in the discussion of QOL matrices, then coefficients of determination can be substituted for the arrows in Duncan's scheme (or some variation of it). This improved notion of causal links could lead to a QOL simulation model which would help us better understand the dynamic interaction among factors and analytical dimensions. A QOL model would be beneficial in that one could realistically determine the net QOL change effected by small changes in a series of key factors or by moderate to large changes in a few factors. The policy ramifications of such knowledge about generating instrumental changes to improve the QOL would be widely spread and beneficial to decision making.

VII.E Generalizing from QOL Data

For each of the QOL factors our formula combines two kinds of data to produce a single number. That number, when summed for all individuals in an area for which the QOL is being determined, becomes a QOL factor index. The earlier part of this section has discussed what can be learned by inspection of the disaggregated index numbers. An outstanding question is, what is a "relevant area" for which to determine the QOL or how far can we aggregate the QOL?

The answer to this question might be that it doesn't matter how far the data is aggregated under certain conditions. If national determination of the QOL is desired, then sampling techniques appropriate to the entire range of cultural and geographic variations in the country should be employed. The costs of such an omnibus endeavor are large and perhaps prohibitive. The costs of sampling and surveying can be reduced to the extent that generalizations are required for regional, state or local QOL indices.

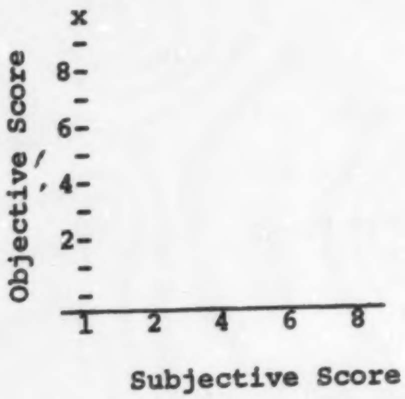
The problem of assessing the QOL may not be cost or the level for which generalizations are scientifically valid, but who or what level of government would be appropriate for financing and administering such an endeavor. The possibility that data collected by a local government for local government uses might be subject to various sources of bias, suggests that state or regional area government be the likely research agency for municipalities within that area.

The argument for scrutinizing variation in patterning across QOL factor index scores by population groups is based on the realization that human goals and values are rarely, consistently, or clearly defined. If QOL is to be made a meaningful concept for decision makers we must learn the circumstances under which it varies or becomes consistent for groups of persons if not for the society as a whole. This section identified the questions and problems which will have to be resolved before the social scientist can respond to the problem of measuring or indexing the QOL.

FOOTNOTES AND REFERENCES

1. Assume the following data has been collected from 10 men and women about "air quality." The data conforms to the demands of the formula for a QOLI. For the sake of this example weights are uniform for men (high at .8 on a scale varying from 0.0 to 1.0). The correlation for the combined group is very low but when separated is increased to a moderate .4 (where 1.0 is perfect association).

The reason for this is that the combined score correlation is curvilinear. As can be seen in the graph below:



Objective conditions are measured as moderate (mean = 4.9) and are variable within a narrow range for both groups. The basic difference in the data is that women are not satisfied and men are. None of this information becomes apparent until the separation by sex is carried out.

	(O) Objective	(S) Subjective	(W) Weight	(S.W) (Sub. x Wt. =)	
1)	4	2	.4	.8	
2)	5	3	.4	1.2	
3)	6	4	.4	1.6	
4)	4	2	.4	.81	
5)	5	3	.4	1.2	
6)	6	4	.4	1.6	Women
7)	4	2	.4	.8	
8)	5	3	.4	1.2	
9)	6	4	.4	1.6	
10)	4	2	.4	.8	
Sum	49		4.0	11.6	

	(O) Objective	(S) Subjective	(W) Weight	(S.W) (Sub. x Wt. =)	
11)	4	9	.8	7.2	
12)	5	8	.8	6.4	
13)	6	7	.8	5.6	
14)	4	9	.8	7.2	
15)	5	8	.8	6.4	Men
16)	6	7	.8	5.6	
17)	4	9	.8	7.2	
18)	5	8	.8	6.4	
19)	6	7	.8	5.6	
20)	4	9	.8	7.2	
Sum	49		8.0	64.2	

From the formula: $F = 1/2\ r\ (\hat{O} + \hat{S})$

Where: $\hat{O} = (1/p\ \Sigma\ W)(1/p\ \Sigma\ O)$
$\hat{S} = 1/p\ \Sigma\ WS$
P = Number in Population

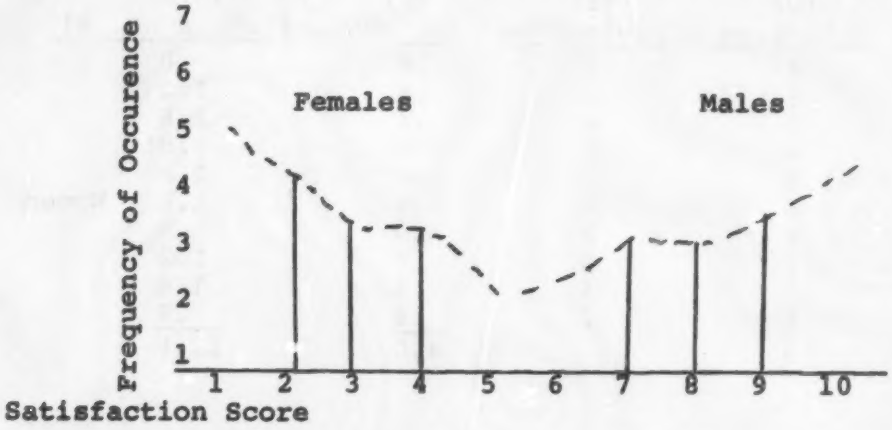
It is computed for women that:
$\hat{O} = (.1 \times 4)(.1 \times 49)$
$= 1.96$
$\hat{S} = (.1 \times 11.6)$
$= 1.16$

$F = (.50)(.40)(1.96 + 1.16)$
$= .62$

And, it is computed for men that:
$\hat{O} = (.1 \times 8)(.1 \times 49)$
$= 3.92$
$\hat{S} = (.10 \times 64.2)$
$= 6.42$

$F = (.50)(.40)(3.92 + 6.42)$
$= 2.07$

Which may be graphically represented by the following chart:



2. Kevin Lynch. The Image of the City. Cambridge, Massachusetts: The M.I.T. Press, 1960, p. 41.

3. Jeanne Sigler and Alan Langowski. *Citizen Attitudes Toward the Environment: An Appraisal of the Research.* (University of Illinois, November 1971) p. 49.

4. Hazel Erskine. "The Polls: Pollution and Industry." *Public Opinion Quarterly*, Fall 1971, p. 263.

5. Irving Hock. "Urban Scale and Environmental Quality." Resources for the Future (January 1972) p. 10.

6. Hazel Erskine. "The Polls: Pollution and Industry." *Public Opinion Quarterly*, Fall 1971, p. 264.

7. Jeanne Sigler and Alan Langowski. *Citizen Attitudes Toward the Environment: An Appraisal of the Research.* Survey Research Laboratory, University of Illinois (November 1971) p. 55.

8. Jane Schusky. "Public Awareness and Concern with Air Pollution in the St. Louis Metropolitan Area." *Journal of Air Pollution Control Association*: 16 No. 2, February 1966, pp. 72-76.

9. Irving Hoch. "Urban Scale and Environmental Quality." Resources for the Future (January 1972), pp. 17-21.

10. Jane Schusky. "Public Awareness and Concern with Air Pollution in the St. Louis Metropolitan Area." Journal of Air Pollution Control Association: 16 No. 2, February 1966, p. 72.

11. Charles F. Hohn. "Reality and Perception of Air Pollution." University of Southern California, June 15, 1972, p. 6.

12. Jane Schusky. "Public Awareness and Concern with Air Pollution in the St. Louis Metropolitan Area." *Journal of Air Pollution Control Association*: 16 No. 2, February 1966, p. 74.

13. Matthew A. Crenson. "The Un-Politics of Air Pollution." Baltimore (The Johns Hopkins Press, 1971) pp. 13-14.

14. Charles F. Hohm. "Reality and Perception of Air Pollution." University of Southern California, June 15, 1972, p. 5.

15. Maurice D. Van Arsdol, Jr., Francesca Alexander and George Sabage. "Human Ecology and the Metropolitan Environment: Environmental Hazards in Los Angeles." Final Report Air Pollution Control Division, U.S. Public Health Service Contract PH 86-62-163, p. 147.

16. *Ibid.*

17. Matthew A. Crenson. "The Un-Politics of Air Pollution." Baltimore: (The Johns Hopkins Press, 1971) p. 15.

18. Jeanne Sigler and Alan Langowski. *Citizen Attitudes Toward the Environment: An Appraisal of the Research.* Survey Research Laboratory, University of Illinois (November 1971), p. 31.

19. *Ibid.*, p. 50.

20. Louis N. Tognacci. "Environmental Quality, How Universal Is Public Concern." Environment and Behavior, Vol. 4, No. 1, 1972, p. 81.

21. Charles F. Hohm. "Reality and Perception of Air Pollution." University of Southern California, June 15, 1972, p. 6.

22. Irving Hoch. "Urban Scale and Environmental Quality." Resources for the Future (January 1972), pp. 7-12.

23. N. Z. Medalia. "Community Perception of Air Quality: An Opinion Survey in Clarkston, Washington." Public Health Service Publication No. 999-AP-10, U.S. Department of Health Education and Welfare. Ohio, 1965.

24. John P. Robinson and Phillip P. Shaver, *Measures of Social Psychological Attitudes* Ann Arbor, Michigan: Survey Research Center, Institute for Social Research.

25. See the discussion of multiple correlation and path analysis in Hubert M. Blalock, Jr. and Arlen B. Blalock, *Methodology in Social Research*, New York, McGraw-Hill Book Co., 1968.

26. Robert C. Tryon and Daniel E. Bailey, *Cluster Analysis*. New York: McGraw-Hill Book Co., 1970.

27. *HEW Perspectives on Human Deprivation: Biological, Psychological, and Sociological*. Washington, D.C.: National Institute of Child Health and Human Development, 1968.

28. Denton E. Morrison, "Some Notes Toward a Theory of Relative Deprivation, Social Movements and Social Change," *American Behavioral Scientist*, May/June 1971, V 14, No. 5.

29. Relationships among the population parameters may be plotted or represented by several methods. Each discipline seems to have its own "turf" of analytical tools, e.g., economics would use indifference, iso-preference curves and other devices, sociologists would use tables, factor and path analysis. Our discussion is limited from representing or comparing the utility of these various schemes.

30. It is an axiomatic assumption among urban planners that problems often occur in syndromes which correspond to physical locations. We also expect that scores on many QOL indices are likely to be highly interrelated for some physical location--the west Boston type ethnic community, the decayed inner city ghetto, the match-box house suburb, the wealthy Georgian estates. Although such variations would be captured partially by our physical environment factor and the analytical dimension of geographic region, it is possibly such an important distinction of QOL variation as to warrant brief comment. Literature in the areas of urban geography and social area analysis are appropriate to apply to the problem of relating patterns of QOL index scores to regional location. The idea of reporting QOL scores on map grids for a locality provides an efficient means by which data can be represented for policy and evaluation. The NEEDS program (see Apendix A) uses this device to report data. As a general example of the illustrative use of grids, overlap, three dimensional time-space graphs, simulation patterns, see "Spatial Diffusion," Washington, D.C., Association of American Geographers, Commission on College Geography, Resource Paper No. 4, 1969.

31. Angus Campbell and Phillip E. Converse, "Monitoring the Quality of American Life."

32. Otis Dudley Duncan. "Discrimination Against Negroes." The Annals v. 371, May 1967, pp. 85-103.

> "In the career of an individual or cohort of individuals the circumstances of the family of orientation--its size, structure, socio-economic status, stability, and so on--provide a set of 'initial conditions' whose effects are transmitted through subsequent stages of attainment or achievement." (Duncan, 1967:87)

33. "Informative data from longitudinal and retrospective studies on representative samples permit something more than impressionistic estimates of how and how much the advantages or handicaps at one stage are transmitted to the succeeding ones." (Blaud and Dunca, 1972; Eckland, 1965, Sewell and Armer, 1966). Such evidence, however, does not exist for earlier time periods in a form that allows reliable inference of trends. And it does not exist (save in the most rudimentary form for 'non whites') for the minorities whose life-cycle patterns are presumed to deviate widely from the American norm." (Duncan, 1967:88).

SECTION VIII
POLICY IMPLICATIONS

VIII.A Introduction

The idea of a quality of life index has aroused far more than only academic interest. Policy-makers, businessmen, as well as academics find the prospect of such an index fascinating for a number of reasons. This discussion will point out some of those reasons, and in particular, begin to answer the following questions: (1) How does a QOL index relate to other work in the field of policy analysis? (2) What might be the uses and (3) the misuses of a QOL index? (4) What can be done to insure that the index will not be used in ways contrary to the intention of its framers?

VIII.B The Use of a QOL Index: Policy Analysis

The first large group of possible uses of a QOL index, depending on how it is constructed, are those relating to policy analysis. This set of possible uses breaks down into three areas, each relating to a major step in the formulating of public policy: (1) assessment of the public's values and preferences, and of objective conditions, (2) analysis of the impacts, trade-offs, and net effects of a given action, and (3) evaluation of the outcome of a policy or action.

VIII.B.1 Assessment of Values and Conditions

Rational social choice obviously rests on correct evaluation of the status quo. In order to solve problems, information must be available concerning the extent and nature of those problems; and, furthermore, it is highly desirable to have information on problems that are just emerging. The first condition, information on existing problems, is not the main channel in which a QOL index can aid assessment of the status quo. Instead, the comprehensive social accounting effort implied in the development of such an index would be of major benefit in locating problems that are just emerging. It is in this area that the present haphazard system of collecting data on social problems is most lacking. A systematic assessment of the quality of life would do much to correct this deficiency. Moreover, it would help policy-makers and others to see problems in greater perspective, and would aid in the development of a holistic or systems approach to social and environmental reality.

But objective conditions are not the only concern of policy-makers: the public's assessments and attitudes toward those problems are important as well. The QOL index would be a comprehensive attempt to assess such values. This would be the case whether the index specifically included indices of satisfaction with objective conditions, or whether the index restricted subjective variables to the weighting of the indicators of objective conditions.[1] In either case, a series of numbers reflecting the relative importance and/or the levels of dissatisfaction of the population would be available to decision-makers. Since resources are limited, choices must be made between a number of problems needing solution. A QOL index would help decision-makers direct their efforts in the areas of most concern to the public.[2]

VIII.B.2 Analysis of Impacts and Trade-offs

The development of a QOL index would not improve the means of assessing the magnitudes of the impacts of a given public policy, except insofar as the index furthered the development of a more comprehensive approach to social problems. The value of a QOL index in, for example, cost-benefit analyses, would be in judging the relative importance of those impacts. In the past, efforts to judge these relative importance ratios have primarily been attempts to translate magnitudes of externalities into monetary figures. A QOL approach would estimate instead the impacts of an action on one QOL figure. It may be found, for example, that the effects of a project are: (a) the lowering of the disposable "income" factor by 1.2 units; (b) the raising the "air quality" factor by 1.6 units; and (c) raising the "aesthetics" factor by 2.0 units. When the weights and dissatisfaction levels associated with these factors are found, the QOL is projected to show a net increase of .2 units. The consequent conclusion could very well be that the project should proceed.

The traditional approach of economic theory to such choices is one of calculating marginal costs and benefits. While a QOL index, as conceived in this and most other studies, is not appropriate for the estimation of marginal costs and benefits, a modification of the surveying technique could in principle yield such information as well.[3]

VIII.B.3 Outcome Evaluation

A QOL index could provide a focus for the emerging field of social experimentation and outcome evaluation. Campbell and Ross describe the goal of such experimentation as follows:

> While the social scientist cannot as a rule experiment on a societal scale, societal "experimentation" or abrupt focused social change is continually going on, initiated by government, business, natural forces, etc. The social scientist adds to his tools for understanding the social system when he attends to these events and documents their effects in as thorough a fashion as possible.[4]

No claim is made that such evaluations and QOL research are the same, but the two can clearly aid in each other's development. The techniques of "quasi-experimentation" could be important tools for estimating changes in the QOL, while the QOL index could become a way of summarizing the impact of a given policy.

Thus a QOL index would be useful in evaluating the outcomes of policies and actions, emphasizing both changes in objective conditions and in the public's attitudes toward those changes.

VIII.C The Use of a QOL Index: Education and Social Science

The possible uses of a QOL index are not restricted to the sphere of government and public policy. The fields of education and social science would also benefit from such an index. In the area of education, it could function as an adjunct to computer simulation models; in the area of social science, it is anticipated that a QOL index could spur the development of a unified science of social, psychological, and environmental interaction.

VIII.C.1 Computer Simulations

Computer simulation is the attempt to summarize many of the aspects of a socio-environmental system into a computer program with which students or policy-makers could interact. An example of this field is the River Basin Model of the Environmental Studies Division of the Environmental Protection Agency.[5] The River Basin Model "deals with any geographical area and many of its associated economic, social, governmental, and water resource characteristics." It is designed to show the interactions between these sectors so that policy-makers and students of environment can better understand the trade-offs involved in any decision that society makes. It is possible that a QOL index could be a valuable input to such computer models.[6] A QOL index is primarily concerned with the measurement of actual social conditions, including the degree of satisfaction of actual members of society, whereas a computer model is purposely an abstraction from reality in order to give computer game "players" a better feel for social and environmental interactions. Nevertheless, the two share a holistic approach to social reality and are thus well-suited to aid in the other's development. Computer simulations may be one way to refine QOL "weights," and QOL indices are potentially important summary variables in computer models.

VII.C.2 Toward the Development of a Unified Social Science

One obvious way in which a QOL measurement effort would affect the social sciences is in making them more oriented toward the problems of policy formulation. It has been said in the past that the social sciences tend too much toward theory or toward specialized knowledge with relatively little practical usefulness.[7] An attempt to regularly measure the QOL would involve many social scientists in an empirical, policy-oriented research endeavor. The scale of such an endeavor would probably be so large as to have a real impact on the general orientation of the social sciences.[8]

A larger implication of the development of a QOL index is that of spurring the development of a unified social science, emphasizing social interactions in all their economic, social, and psychological aspects.

The idea of a unified social science is not new. A great many observers have become dismayed by the extent to which the social sciences have specialized and become unaware of the insights of their sister sciences. In economics, for example, a call has gone out for a new approach to the measurement of economic performance, one which would look beyond the narrow horizon of monetary accomplishment.[9] For a merging of the social sciences to occur, there must be a common empirical ground, a common unit of analysis. This unit of analysis would be closely related to human welfare and happiness, and would need both micro- and macro-aspects for social scientists of various orientations to analyze. A quality of life index, constructed in a way that is respectable to the various social sciences, would provide such a common denominator.

The history of science provides numerous examples of an empirical tool stimulating the growth of a vast theoretical body of knowledge. Astronomy and the telescope, biology and the microscope, economics and the development of GNP accounting--all are such examples. It is reasonable to suppose that a high-quality QOL index could have a similarly important impact.

VIII.D The Use of a QOL Index: Improving the Market Mechanism

A QOL index could be useful to the private sector in ways that are quite similar to the ones outlined in reference to the public sector. The entrepreneur cannot rationally invest his money without information on the demand that exists for the good he is contemplating producing. In the past, such choices were often based on intuition and past experience. The result has been that the market has not been as responsive to the public's needs as it could be with more accurate knowledge of what those needs are. A QOL index, by making explicit the relative importance of the various aspects of the quality of life, would help the entrepreneur to make more rational investments, and to allocate his resources in ways that are most beneficial to him and to society.

As a brief example, a QOL index computed 20 years ago might have revealed rapid depletion of natural resources, an alarming rate of increase in litter and solid waste, and a high weight placed by the public on having an environment without such litter and waste. The development of ways to recycle such residuals by industry might have begun much earlier, in response to the existence of a demand for recycling devices. Over a period of time, prices for such devices would have dropped, and there could be at present more recycling of residuals.

Another way in which a QOL index would be useful to private individuals is in helping them decide where to live.[10] An index broken down by locality would suggest those areas whose environment is most pleasant. Individuals in crowded, unpleasant environments would be drawn to the more pleasant ones, and would thus exert a pressure on local governments to meet their constituents' needs. Otherwise, such governments would lose much of their tax base. Thus the natural equilibriating processes of the social system would be facilitated and time lags would be reduced.

VIII.E Misuse of a QOL Index

In examining the various implications of the development of a QOL index, it would be unappropriate to emphasize the positive potentialities of such an index and ignore the possible misuses and dysfunctions of a QOL index. There are three potential misuses of a QOL index per se: (1) the attempt by policy-makers to change subjectively determined weights instead of objective conditions; (2) the treating of QOL as the only measure of a society's well being; and (3) the conforming of individuals to the standards of a QOL formula.

Any QOL index would be composed of two types of numbers: those reflecting objective conditions and actual states of mind, (e.g. the amount of air pollution, and the actual degree of work satisfaction), and those reflecting the relative importance of such conditions to the individuals whose QOL is being measured. The first type of numbers we have called indicators; the second, weights. Now it is clearly laudable (within the limits of society's choices) for governments to try to bring the first kind of numbers into line with what society considers "good." But it is equally clear that an attempt by governments to control the second kind of numbers--the weights which individuals assign to QOL factors according to their subjective tastes--is outside of the bounds traditionally assigned to government activity. Such an attempt would in fact be what Orwell and Huxley have warned in their descriptions of future "brave new worlds".

One could envisage such a development if the QOL turns out to be a highly variable number or set of numbers. After a number of years the QOL would become fairly respected as a measure of social welfare, and politicians trying to unseat incumbents would use any drop in the QOL index as evidence of their opponents' irresponsibility. Those in office would be tempted to raise the QOL by whatever means available. And they might find that changing weights is a more expedient route than influencing indicators. Thus a single-minded chase to improve that magic number, QOL, would lead governments in the direction of despotism.

If, on the other hand, the QOL index turns out to be a fairly constant number--changing, for example, one percent per year--the chances of this scenario occuring are small.

The second misuse of a QOL index is closely related to the first. Ideally, a QOL index would include everything that influences a community's welfare, but, as previous sections have demonstrated, the measurability of many factors is extremely limited. Among the hardest to quantify are those relating to freedom and justice--the extent of civil liberties, and the responsiveness of governments to their electorates. An operational QOL index would probably have to leave such factors out, due to their dichotomous and hard-to-quantify nature. The second misuse of a QOL index is that, without trying to change subjective weights, the QOL index would be treated as the single measure of a government's performance. With certain vital intangibles left out of the index, this would amount to the sacrificing of such intangibles--e.g. freedom and justice--in order to maximize the easily quantified factors. The result would be much like that of the first misuse, although the route to this misuse would be slightly different.

The third misuse of a QOL index relates not to a government's actions so much as to a change in the attitudes of individuals. The QOL index is meant to register the people's preferences and concerns. The index is not meant to actually influence those preferences. Yet in a conformistic society, such an eventuality is quite possible: it may become unfashionable to have a preference structure that does not conform to the average weights listed in the QOL index. This would tend to make the index rigid and limit people's individuality, as well as destroy the whole purpose of the QOL index.

VIII.F Misuse of Social Indicators

The potential misuses of social indicators must also be considered, for any QOL index would be based in part on such indicators. These abuses may be divided into two categories: first, problems that make it difficult for social indicators to adequately reflect social reality; and second, problems in the actual gathering of social indicators, no matter how valid they may be.

As Etzioni and Lehman point out[11] there are essentially two kinds of dysfunctions with any kind of social measurement: "fractional measurement," and "indirect measurement". The tendency to choose single-dimensional in preference to multi-dimensional measurements (when the latter may be more appropriate), and the tendency to choose quantitative rather than qualitative measures (when the quantities chosen do not necessarily correspond to that which they are supposed to measure) properly belong under the first heading. As an example of the latter dysfunction, they cite the "story of the Soviet railroad manager, charged with having to deliver x wagons, but, having nothing to deliver, sending his wagons back and forth--empty". Indirect measurement is the use of statistics for purposes other than those for which they were designed. For example, in a study of population density in New York City, it was found that residential population declined while daytime employment and visitors were rising. In this case, population figures were not necessarily an accurate guide to overall population density. Etzioni and Lehman also point out other similarly difficult-to-solve problems with social indicators.

The difficulties related to the actual gathering of social indicators have been effectively stated by Henriot. One class of difficulties includes those which tend to raise one kind of social scientist and one class of citizen above all others. The emphasis on "hard data" in social indicator research tends to exclude those who prefer to treat more qualitative aspects, and tends to elevate, in particular, the economists. Similarly, the well-educated and well-organized are better equipped to argue in the language of numbers than are the poor and disadvantaged. Thus, Henriot claims,

> There is a danger that persons who develop the "best" programs for society may tend to impose these upon the non-elites who do not understand them or...who do not want them.[12]

The social indicators approach tends to strengthen the position of those who see government as essentially a matter of solving problems, as opposed to resolving issues. Thus the proponents of social indicators are linked in some people's minds with the more familiar technocrats.

A second group of difficulties relates to the problems of choosing which indicators to gather. Henriot poses such questions as: "What influence will lobbying pressures have on the gathering of data?" "What influence will the character of a particular agency have upon the gathering of data?" "Who will see the information output? Will it be restricted to the 'ins'?" Closely related to these questions are the possible danger a "national data bank" might pose to privacy. Finally, Henriot questions whether the emphasis on technical approaches to government may create a kind of vacuum of moral leadership. The current nostalgia for leaders with "charisma" may indicate that such a vacuum is already developing.

VIII.G Suggested Ways to Guard Against Misuse

Clearly, means must be found to avoid such abuses of a QOL index and national accounting system. Of course, one alternative would be simply not to measure the QOL. But the interest in and pressures for such social measurement may be so strong as to outweigh the dangers cited above. In such a case, the following steps are recommended to avoid misuse of a QOL index:

First, there is a need for centralizing the measurement of QOL, without making the QOL index a mere tool to justify the status quo or an administration's past performance. Senator Walter Mondale's proposal to establish a Council of Social Advisors[13] (modeled on the existing Council of Economic Advisors) would be a step in the right direction. These Social Advisors would be distinguished academicians in the fields of sociology, political science, and the other social sciences (economics would not necessarily be excluded) and would prepare an annual Social Report. To help insure that the QOL index would not be used to the disadvantage of the "outs," the Council of Social Advisors could be made directly responsible to Congress.

Second, the actual measurement of QOL should be done by a research team as independent as possible from the main institutions of government. If it is desired that the research team be funded directly by the government, the funding could be made permanent by the establishment of a trust fund or by establishing a public corporation to finance the research. An existing research institution funded by the Federal government, such as the Urban Institute, would be an alternative channel for measuring QOL. Alternatively, the job of measuring QOL could be contracted to a university or a group of universities.[14]

Third, it is essential that the QOL measurement process be made the subject of wide public discussion and periodic, formal re-examination.[15] This re-evaluation should not be limited to a recalculation of QOL "weights", but should instead cover the whole structure and philosophy of the QOL index, focusing especially on the choice of factors and indicators. Such a re-examination process would both add to the quality of the measuring tool, and would minimize the chance that the index would be used for purely political purposes. It would, in addition, stimulate discussion and research in the social sciences, and thus spur the kind of development in the social sciences generally that occurred in economics subsequent to the establishment of the national income accounting system.

Fourth and perhaps most importantly, the philosophy of the QOL index needs to be further developed, and both the public and policy-makers must be made fully aware of the limitations of a QOL index. This is the only way to minimize the chance that the index would be used as a means to create conformity, or to justify actions that ignore those hard-to-quantify factors (such as liberty and social justice) that may never find their way into a QOL index. It is anticipated that this process of making the public aware of the limitations of the index would be easier in the first years of its use, when the public is likely to be skeptical about the index anyway. The difficulty would arise after a number of years, when, assuming the QOL index survives at all, the index would probably have attained greater credibility. Familiarity with the index may tend to blind people to its limitations. This task, which is essentially one of education, is perhaps the most difficult to implement of our suggestions for minimizing the dangers inherent in a QOL index.

No claim is made that these suggestions would totally eliminate the dangers cited earlier in this discussion. They may, however, reduce those dangers to a level such that the potential benefits of a QOL index would outweigh the possible costs. Of the many issues raised in this report on QOL measurement, the problem of guarding against these dangers perhaps deserves the greatest amount of further discussion and research.

FOOTNOTES AND REFERENCES

1. Both alternatives are considered because neither approach has won general acceptance.

2. It is not clear a priori whether government decision-makers have as their primary goal the betterment of objective conditions or simply to reduce dissatisfaction. In many cases it may be easier simply to reduce dissatisfaction by persuading people that conditions are not as bad as they originally thought, or by hiding from them the existence of conditions which would make them more dissatisfied if the conditions were known. It seems likely, however, that the overall level of dissatisfaction is not as easily controllable by policy-makers. Reducing dissatisfaction in one area, using the most expedient means, may only shift dissatisfaction to another area. The alternative approach, involving an entirely different political philosophy, would be to focus on solving objective problems, with reduced dissatisfaction as the usual, but not necessary, result. The usefulness of a given QOL index would depend on which approach its governmental users intend to follow. If they choose the former route, the QOL index should emphasize numbers approximating levels of dissatisfaction. If the latter route is chosen, the QOL index should emphasize objective social and environmental indicators. Whatever the objective, however, the QOL index is likely to be useful in each of the three ways cited above. In the one case, "status quo" and "costs and benefits" would be stated in terms of levels of satisfaction; in the other case, they would be stated in terms of objective conditions. The QOL index suggested in this report represents a compromise between the two approaches.

3. The policy usefulness of a QOL index is affected by the degree to which it emphasizes conditions at the margin. The marginal benefit of any good, public or private, is the benefit of one more increment of that good. The relative value or importance of that good is something quite different, reflecting the contribution the stock of that good makes to an individual's or community's welfare. The former concept is a "flow" concept; the latter is a "stock" concept. QOL indices are normally thought of as reflections of a certain state of being, and are thus stock concepts. The weights in such indices are therefore most appropriately measures of relative value or importance. But for the policy-maker trying to determine just how much money to allot to a given project, information at the margin is much more useful. This suggests the desirability of developing a separate, "flow QOL" index, whose weights are approximations not of relative importance, but of marginal benefit. It is anticipated that such approximations are much harder to obtain than approximations of relative importance, as

defined elsewhere in this report. In any case, the "stock QOL" index developed in this report is quite useful in determining whether a project should be started at all, because in this case information at the margin is less important than overall relative importance and relative dissatisfaction data.

4. D. T. Campbell and H. L. Ross, "The Connecticut Crackdown on Speeding: Time Series Data in Quasi-Experimental Analysis," in E. R. Tufte, ed., The Quantitative Analysis of Social Problems. (Reading, Pa., Addison-Wesley: 1970), pp. 110-125.

5. Peter House, et al., River Basin Model: An Overview (Washington, D.C.: USGPO #16110 SRU, December 1, 1971).

6. The River Basin Model includes a QOL index, but it is presumed that similar computer simulation models do not. In any case, research in the direction of making such indexes more sophisticated could clearly help in the refinement of such models.

7. See, e.g., Yehezkel Dror, Public Policymaking Reexamined (Scranton, Pa.: Chandler, 1968).

8. Cf. Senator Walter Mondale, "Reporting on the Social State of the Union," Trans-action V (June 1968) pp. 34-38.

9. F. Thomas Juster, "On the Measurement of Economic and Social Performance," National Bureau of Economic Research Annual Report, 1970, pp. 8-24.
Mancur Olson, "The National Accounts and the Level of Welfare" (mimeo, 1972--University of Maryland).

10. It must be remembered, however, that this applies only for those with a certain amount of mobility, and excludes, for example, many residents in urban ghettoes.

11. Amitai Etzioni and E. W. Lehman, "Some Dangers in 'Valid' Social Measurement," Annals of American Academy of Political and Social Science Vol. 373 (September 1967), p. 2.

12. Peter Henriot, "Political Questions about Social Indicators," Western Political Quarterly, XXIII (June 1970), pp. 235-255.

13. Mondale, ibid.

14. This point emerged in a discussion with Cherie Lewis, a colleague of the author.

15. It goes without saying that the QOL data should be fully available to the public. Information on weights, however, may be more wisely restricted, in order to minimize the conformist effects cited earlier in this section.

SECTION IX
APPENDICES

APPENDIX A

I. Applied Research

A.	TITLE	"An Environmental Quality Rating System"*
	KEYWORD	A single index quality
	AREA	Human population, community resources, water resources, land forms, leisure, vegetative resources, wildlife, historical areas.
	FOR	Bureau of Outdoor Recreation, Department of Interior
	BY	Rolland B. Handley, J. R. Jordan and William Patterson
	LOCATION	Washington, D.C.
	DATE	Since 1971

This amounts to a rating system that attempts to quantify all of the (+) and (-) values in an area in an additive fashion. The higher the score the greater the assigned weighting. Although this system has the advantage of keeping separate and comparable the desirable (+) and undesirable features (-) it is limited in many other respects. Evaluation in most categories is intuitive and value standards arbitrary.

B.	TITLE	"QOL in Urban America--NYC: A Regional and National Comparative Analysis"*
	KEYWORD	Indices of Life Quality in Urban Areas
	AREAS	Crime, EQ, Revenue and Budget, Taxation, Welfare and Social Services
	FOR	
	BY	NYC Mayor's Office
	LOCATION	NYC
	DATE	May, 1971

"The NY study uses urban, economic, social environmental and some general indicators to measure the QOL" ... "The NY study does not include innovative indexing procedures, but relies upon bar graphics to project the differences between past and present levels of pollution. The Study is intended solely for the use of decision makers, and lacks the simplification needed to make it a useful public information tool." (Research Analysis Corporation, 1972:29-30)

C.	TITLE	"Systematic Measurement of the Quality of Urban Life--Prerequisite to Management"*
	KEYWORD	Indices of Life Quality in Urban Areas
	AREAS	(undetermined)
	FOR	Los Angeles Community Analysis Bureau
	BY	Research Analysis Corporation, McLean, Virginia
	LOCATION	Los Angeles, California
	DATE	May, 1971

"data for the indicators of life quality are obtained from computerized files of the in-process activities of the L.A. operating departments ..." Utilizing the SYMAP computer graphics program "a comparison of the QOL that is enjoyed by different communities within the city" is possible. Areas are located "where conditions are worst and where funds should be expanded by the city to improve the life of its citizens." (Research Analysis Corporation, 1972:29)

D. TITLE "Environmental Quality Index" Volume I

KEYWORD Single Index of the Quality of the Environment

AREAS Air and water, land related, multi-media, social/aesthetic

FOR County of San Diego

BY Research Analysis Corporation

LOCATION San Diego

DATE June, 1972

"This report describes the research, recommendations and implementation plan for using the suggested indicators to inform the public of the changes in the quality of the environment (p. V)." The strategy adopted is similar to that used by D. J. Montgomery--"The basic concept involved in this approach is to determine the value of the environmental assets of the region and then to determine and subtract from this the degradation, or "insults" to the environment. The resulting number is a Single Index of Environmental Quality. (Appendix A, p. 99).

R. B. Handley, et al., An Environmental Quality Rating System, Department of Interior, Bureau of Outdoor Recreation, N.E. Region, Staff Report, 1970. Also P. J. Montgomery, A Framework for Research, delivered to the 138th Meeting of the AAAS, Philadelphia, Pennsylvania, December 30, 1971. This material did not come to our attention in time for direct evaluation.

E.	TITLE	Neighborhood Environmental Evaluation and Decision System (NEEDS)
	KEYWORD	Community Evaluation Plan
	AREA	Housing, environment, accessibility to conveniences, crowding, street quality
	FOR	Volunteer Cities
	BY	Department of Health, Education and Welfare, Public Health Service, Bureau of Community Environmental Management
	LOCATION	Washington, D.C.
	DATE	From 1968

NEEDS is a methodology combining both opinion and factual data to determine numerical scores for pre-selected urban areas. The score patterns will be used to identify areas of high priority for local city management officials. Data is provided in the form of map presentations as well as in tabular form. The program is currently under way having collected data from a score of moderately sized urban areas with a net population of over 3.5 million. The combined subjective and objective data is being analyzed by correlational and cluster analytical techniques. Emphasis is placed on the area of health data. Emphasis on this area, however, is tempered by a strong orientation toward interrelated aspects of urban problems. The analysis scheme tends to isolate areas where problems occur as syndromes as well as areas characterized by single difficulties. NEEDS is well developed as a decision-making aid and asset to local incentives. An elaborate reinforcement program is a part of the NEEDS model and serves to implement changes suggested through NEEDS by assisting coordination with higher government funding agencies.

F. TITLE	Environmental Evaluation System for Water Resource Planning
KEYWORD	Environmental Evaluation System (EES)
AREA	Ecology, environmental pollution, aesthetics, human interest
FOR	Bureau of Reclamation, Department of Interior
BY	Battelle
LOCATION	Columbus, Ohio
DATE	January, 1972

"The EES was designed for use in evaluating the environmental impacts of the Bureau of Reclamation's water resource development . . . Water resource developments may create both beneficial and adverse impacts on the environment. Because properties are not commonly measured in commensurate units, it is difficult to evaluate the net environmental effects of a Bureau project. To solve this trade-off problem, Battelle-Columbus developed a technique to transform all parameters into commensurate units (p. 6-7)."

Step 1. Transform all parameter estimates (actual measure in feet, acres, etc.) into their corresponding environmental quality (defined onto a scale varying from 0 to 1.0)

Step 2. Weigh all parameters in proportion to their relative importance. (Weights are assigned.)

Step 3. Multiply the environmental quality of the parameters by their relative weights to obtain common units (Step 1 times Step 2 = a solution to the trade-off problem.) (Parenthetical notes ours.) The relationship between virtually any measurement and a scale of varying quality is obtained upon which actual measurement can be plotted as a graph line which is a common reference for diverse projects.

II. Pure Research

A. TITLE "The Quality of Life in Metropolitan Washington, D.C."

KEYWORD Indices of Life Quality in Urban Areas

Areas Income, unemployment, poverty, housing (costs), education, health, mental health, air pollution, public order, racial equality, citizen participation, community concern, transportation, social disintegration

FOR

BY Urban Institute

LOCATION Washington, D.C.

DATE March, 1970

Indicators of the focal area were developed and comparisons made for 18 large metropolitan areas. "The indicators are then employed to develop charts and summary tables which use Washington, D.C. metropolitan area as an illustrative example. These sample charts show Washington's (a) current status in each quality category; (b) its recent and latest rankings; and (c) its recent rates of change as compared with similar data from the 17 other large metropolitan areas. Central cities and suburbs of the 18 metropolitan areas are examined with respect to five of the QOL categories. There is a tabulation and summary of the five indicators as they reflect conditions for the central cities and suburbs, ratios between city and suburban areas, and rates of change in these factors (from the abstract)."

B. **TITLE** "Experimental Assessment of Delphi Procedures with Group Value Judgements"

KEYWORD Delphi Generated QOL Factors

AREAS (Undetermined)

FOR

BY Rand (Dalkey and Rourke)

LOCATION Santa Monica, California

DATE February, 1971

University students participated in a Delphi group consensus seeking strategy to generate and rate value categories relating to higher education and QOL. Thirteen QOL factors were identified:

1. novelty, change, newness
2. peace of mind, emotional stability
3. social acceptance, popularity
4. comfort, economic well-being
5. dominance-superiority
6. challenge, stimulation
7. self-respect, self-acceptance
8. privacy
9. involvement, participation
10. love, caring, affection
11. achievement, accomplishment, job satisfaction
12. individuality, conformity, spontaneity
13. sex

This work was designed primarily to test the utility of Delphi procedures on non-factual data.

C. **TITLE** Urban Land Use Planning

KEYWORD Urban Activity Systems

AREAS (Undetermined)

FOR

BY F. Steuart Chapin

LOCATION University of North Carolina, Chapel Hill

DATE 1965

The QOL may be defined as a pattern of activities voluntarily engaged in by individuals and differentially weighted and valued by them. Although not a QOL study per se Chapin is engaged in work which no informal discussion should leave unattended. Chapin has developed a household survey scheme to probe the following QOL related activities: (1) income producing activities; (2) family activities; (3) education; (4) spiritual development; (5) social activities; (6) recreation and relaxation; (7) interest group activities; (8) community service and political activities; (9) physical maintenance activities (medical, shopping, etc.). Chapin discusses an experimental survey technique aimed at time budget analysis. This may provide an excellent means to develop weightings on different aspects of the QOL and shed light on the trade-offs and marginal choices people might be prone to make. If the preference structure can become apparent through such techniques then those policy alternatives which enhance the QOL would be scaleable according to preference. A clear notion of the trade-off options is still required, however.

D. TITLE Monitoring the QOL

KEYWORD

AREAS

FOR National Science Foundation, Russell Sage Foundation

BY Institute for Survey Research

LOCATION Ann Arbor, Michigan

DATE Since 1971

I.S.R. activity is the only basic scientific activity under way on the issue of QOL which came to our attention. Two projects are currently under analysis. Angus Campbell, Philip Converse and William Rodgers have attempted to establish a "base line" study of satisfaction with 13 QOL related areas (marriage, work, education, etc.) and the general feeling of life satisfaction. This study attempts to establish the role of "importance of factor" as an independent measure in addition to the determination of satisfaction. Analysis of this data includes correlational regression and cluster analysis. The study is based on a nationwide survey conducted in August, 1971 (N = 2164). With the sponsorship of a N.S.F. grant, Steve Withey and Frank Andrews are currently analzying data collected in May, 1972 from a nationwide sample (N = 1300). This study attempts to determine the differences resulting from different "social indicators" of life experience and life satisfaction. Questions about several QOL related areas were compared: satisfaction, happiness, semantic differential pairs, and a modified internal-external control scale. The purposes of this research is an attempt to perfect better subjective indicators. I.S.R. scientists also hope to be able to establish empirically defined areas of concern among the American people. (The Russell Sage Foundation sponsored research is well described in Lear, 1972).

E. **TITLE** "Quality of Life in the United States--An Excursion into the New Frontier of Socio-economic Indicators"

KEYWORD Rank Ordering of States

AREA Individual status, racial equality, state and local government, education, economic growth quality, technological change, agriculture, living conditions, health and welfare

FOR

BY Midwest Research Institute (John O. Wilson)

LOCATION Kansas City, Missouri

DATE 1969

This paper presents a detailed analysis and rank ordering of the 50 states, based on several socio-economic indicators developed by Wilson. (See above listing for the nine areas on which states were ranked.) Data used had been collected from national, state, local and special sources. Included in the paper is a review of social indicator literature and a discussion of the type of information needed to develop indicators.

APPENDIX B

Subjective Indicators

A methodology may be devised by which a determination is made of measures of subjective levels of (people's) satisfaction. Furthermore, the levels may be levels of measures of the factors and the importance (weighting) people attach to each of those factors in relation to all other factors.

The most consistently used tool for such subjective measurement of social psychological states is the survey. Since it is not feasible to query the entire population (due to time and budgetary limitations), a sample survey is useful. In such a survey, characteristics of the defined population or universe are inferred from a small group of "representative" subjects.

Selecting the Sample

There are various types of sample survey techniques used by social researchers (simple random sample, stratified random or quota control sample, area sample, etc.).[1]

For purposes of this research, the area sample was considered the most useful technique. As Kerlinger explains it:

> Area sampling is the type of sampling most used in survey research. First, defined large areas are sampled at random. This amounts to partitioning of the universe and random sampling the cells of the partition. The partition cells may be areas delineated by grids on maps or aerial photographs of counties, school districts, or city blocks. Then further subarea samples may be drawn at random from the large areas already drawn. Finally, all individuals or families or random samples of individuals and families may be drawn.[2]

The basic example to be followed in sampling techniques was taken from the "Neighborhood Environmental Evaluation and Decision System (NEEDS)" developed by the Department of Health, Education and Welfare. Stages I and II of their survey rationale slightly modified are useful guidelines:

> The objective of Stage I is to delineate geographic areas within the city. . . . Stage I consists of a . . . survey on . . . randomly selected blocks . . . in neighborhoods of the community.
>
> State II consists of an interview of randomly selected families in the study areas. . . .[3]

Measurement of Subjective Assessment of Objective Conditions

A series of descriptive statements of the previously defined factors can be used in the survey instrument. The respondent is presented with these statements and asked to rate their applicability to him or his feelings about them along the dimension "strongly disagree . . . strongly agree" (a Likert Scale).[4] Integral values are then assigned to each scale point and total scores are obtained by a simple summation. By dividing the sum by N (number of respondents), a mean score for each variable will be obtained. Statements can be worded positively or negatively to avoid acquiescence.

Factor Weighting

To weight the subjective factors as to their relative importance to an individual, a Q-sort technique was considered most applicable.

The Q-sort methodology is a sophisticated form of rank ordering objects, then assigning numerals to subsets of the objects for statistical purposes. The methodology centers on sorting decks of cards into piles.[5]

A set of objects (in this case cards, on each of which is listed a factor) is given to a respondent (R) to sort into a set of separate piles (ranging from most important to least important). It is suggested that the card deck be sorted by using an unstructured sort, and that the sort be three-fold (that is, R be given three cards at a time and asked to place each card in the pile indicating the degree of importance of the factor to him).

To validate the results of the Q-sort rank order correlations developed from analysis of the sort, two additional tests should be applied. One should discover the intensity of an individual's commitment to solving the problems relating to the factors described in the factor list, in terms of sacrifice of both money and free time. To do this, R can be given a list of the QOL factors and asked to indicate how much money he would be willing to give to improve the status of each QOL factor. Next, he would be asked to indicate how much of his free time (assuming an average of free time throughout the population) he would be willing to donate. The money and free time donated would be recorded beside each factor and compared with the rank order assigned to each factor by R in the Q-sort, and correlations developed.

Subjective Assessment Sample Questions

The instructions to respondent R would be:

Please read each of the following statements carefully and CIRCLE the letter or letters which best express your feelings about the statement.

If you STRONGLY AGREE with the statement, CIRCLE SA

If you AGREE (but not strongly), CIRCLE A

If you are UNDECIDED (that is, you neither agree nor disagree), CIRCLE U

If you DISAGREE (but not strongly), CIRCLE D

If you STRONGLY DISAGREE with the statement, CIRCLE SD

If you are in doubt, circle the letter which most nearly expresses your present feeling. Please circle only one letter for each statement.

Following the instructions, the questions (in the form of statements) would be listed. Below are examples of this technique oriented toward eliciting responses usable as indicators for each of the Sectors presented in Section 6.0 of this report.

1. Economic Sector

Income

S: As soon as we get a pay raise the cost of living goes up and we are worse off than before. SA A U D SD

S: Most of my friends have plenty of money left over each month to buy what they want and have a good time. SA A U D SD

Income Distribution

S: Some people will always be poor no matter what you do for them. SA A U D SD

S: People like me should not have to pay high taxes while others pay practically nothing. SA A U D SD

Economic Security

S: These days it is almost impossible to save any money after the bills are paid. SA A U D SD

S: The Federal Government should provide more benefits for people like myself. SA A U D SD

Work Satisfaction

S: I really enjoy my job. SA A U D SD

S: I don't particularly like most of the people I work with. SA A U D SD

2. Social Sector

Family

S: I think it should be just as easy to get divorced as it is to get married. SA A U D SD

S: Most parents don't pay enough attention to their children. SA A U D SD

Community

S: I think attending public hearings is a waste of time. SA A U D SD

S: Most elementary and high school teachers are overpaid. SA A U D SD

Social Stability

S: If a person really wants to work he can always find a job. SA A U D SD

S: People who loot stores ought to be shot on sight. SA A U D SD

Physical Security

S: It is safe for me and my family to walk on the streets at night. SA A U D SD

S: If I were robbed, the police would quickly catch the criminal. SA A U D SD

Culture

S: I would like to attend more concerts and plays but it costs too much to go. SA A U D SD

S: Most people really don't appreciate the talented performers who live in this area. SA A U D SD

Recreation

S: Children in this neighborhood would like to play in the park but it is too far away. SA A U D SD

S: Recreational facilities are usually open at times when most people can use them. SA A U D SD

3. Political Sector

Electoral Participation

S: So many other people vote in the general elections that it doesn't matter to me whether I vote or not. SA A U D SD

S: If a person doesn't care how an election comes out he shouldn't vote in it. SA A U D SD

Non-Electoral Participation

S: I think it is just as important to vote for local candidates as it is to vote for a presidential candidate. SA A U D SD

S: Attending public hearings is usually a waste of time. SA A U D SD

Government Responsibility

S: People in this area have to complain frequently in order to get the garbage picked up.
SA A U D SD

Civil Liberties

S: There isn't as much freedom in this country as there used to be. SA A U D SD

S: The people around here who publish underground newspapers often get arrested.
SA A U D SD

Informed Constituency

S: The coverage of news on television is generally biased. SA A U D SD

S: When the news is presented on television, it is hard to tell what is fact and what is opinion.
SA A U D SD

4. Health Sector

Physical

S: People like me can not afford to get sick because doctors and hospitals cost so much.
SA A U D SD

S: In general, my family receives good medical care whenever we have to see a doctor.
SA A U D SD

Mental

S: In general, the mental health program in my community is quite good. SA A U D SD

S: Most of my friends could not afford the cost of seeing a psychiatrist. SA A U D SD

Nourishment

S: In my opinion the quality of the food sold in grocery stores is not as good as it used to be.
SA A U D SD

S: Food prices are so high that people like us can't feed our children the right kind of meals.
SA A U D SD

5. Physical Environment

Housing

S: In my neighborhood people try hard to make their homes look nice. SA A U D SD

S: Almost any place would be better than where I am now living. SA A U D SD

Transportation

S: Where I live a person really needs a car to get around. SA A U D SD

S: I would probably ride the bus more often if it didn't cost so much. SA A U D SD

Public Services

S: When gas, electric, or telephone companies try to raise rates, the government makes a thorough evaluation of their requests with the interest of people like me in mind. SA A U D SD

S: Garbage collection in my community is prompt and efficient. SA A U D SD

Material Quality

S: The trouble with most products these days is that the manufacturers are just out to make a fast buck.
SA A U D SD

S: Everything we buy seems to fall apart.
SA A U D SD

Aesthetics

S: In my area developers try to avoid cutting down trees unless it is absolutely necessary.
SA A U D SD

S: Local officials are very concerned about things like ugly billboards and commercial signs.
SA A U D SD

6. Natural Environment

Air

S: The air we breathe is just as pure as it ever was.
SA A U D SD

S: Air pollution is getting so bad that someday we might have to stop using automobiles.
SA A U D SD

Water

S: Our drinking water usually tastes pretty good.
SA A U D SD

S: I don't think that the local water treatment plant gets all the harmful substances out of our drinking water. SA A U D SD

Radiation

S: If a nuclear power plant were built within a few miles of my home I would probably move somewhere else. SA A U D SD

S: I feel certain that health officials will quickly notify us if there is a danger of too much radiation. SA A U D SD

Toxicity

S: I really worry sometimes about the harmful substances in the food we eat. SA A U D SD

S: People spend too much time worrying about things like mercury or lead poisoning.
SA A U D SD

Solid Wastes

S: The factories dump too much solid waste materials into the rivers and on the ground in this community.
SA A U D SD

Noise

S: Where I work the noise is often uncomfortable.
SA A U D SD

S: I have considered moving somewhere else because the noise is so bad. SA A U D SD

FOOTNOTES AND REFERENCES

1. For details on the applicability of certain types of sample selection, see Mildred Parten, Surveys, Polls, and Samples (New York: Harper & Row: 1950) passim.; Fred N. Kerlinger, Foundations of Behavioral Research (New York: Holt, Rinehart, and Winston, Inc.: 1964) Chapter 22; and Bernard Lazerwitz, "Sampling Theory and Procedures," in Blalock and Blalock, eds., Methodology in Social Research (New York: McGraw Hill: 1968) p. 278.

2. Fred N. Kerlinger, Foundations of Behavioral Research (New York: Holt, Rinehart, and Winston, Inc.: 1964) p. 399.

3. NEEDS: Cleveland, Ohio, Stage I Report, March 1972, p. 5.

4. P. Likert, "A Technique for the Measurement of Attitudes," Archives of Psychology, 1932, No. 140, pp. 1-55.

5. See W. Stephenson, The Study of Behavior (Chicago: University of Chicago Press: 1953).